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Notes of the Month

INTERNATIONAL KNITTING MACHINERY EXHIBITION

DEVOTED exclusively to the machinery, accessories and ancilliary equipment used in the preparation, manufacture and making-up processes of knitted fabric and goods, the exhibition now open at Belle Vue, Manchester, has undoubtedly attained a new record in this specialised field. Eleven countries are represented and, it is interesting to note, more than half of the exhibitors are from outside the U.K. It is, of course, quite impossible to give even brief details of all that is on view but visitors have the opportunity of seeing several new machines not previously exhibited in Britain or Europe.

A well-known U.K. company is showing a new model for garment length production with a 1/1 or 2/2 border, to interlock or double pique, also 2/2 border to 1/1 body. This is an 8-feeder machine. 12 n.p.i., 18 in. dia. with a four-colour striper at each feeder. Another machine exhibited by the same firm is a striking advance in the range of jacquard piece goods machines, in that the pattern area has been appreciable increased to meet the demand for larger designs. Important new developments in warp knitting machinery are on view from British and Continental makers. A West German manufacturer of warp knitting machines, is showing models not displayed at any exhibition previously, which it is understood incorporate new principles that greatly increase the versatility of the machines. Another firm also show their latest warp knitting machines, also warping equipment which has an hydraulic loading system, disc brakes and interchangeable pressure rollers.

Two outstanding British machines for fully-fashioned knitwear are on view, one with card control which facilitates high-speed operation, automaticity and versatility, the second a fully automatic machine for fashioned rib garment production. Claimed to be built in accordance with an entirely new conception and equipped with two cam carriers, a machine producing collars at the rate of 70 per hour is exhibited and one continental firm, showing its latest hand flat knitting machine, is also displaying a new fully automatic double system flat knitting machine with stitch transfer, two-speed regulation and three heights of butt.

In addition to knitting machinery, other exhibits include a comprehensive range of other types of machines and equipment used in the production of knitwear, Of interest is a new re-winding machine, displayed by an Italian maker, for high-speed single-end re-winding from pirn or cake on to large uptwister bobbins taking approximately 4 lb. of yarn. Many developments of interest to dyers and finishers include a new type British hank dyeing machine with a revolutionary circulating system and, from Germany, an automatic brushing and raising machine with teazles and a new model which incorporates wire carding. An Italian exhibit is a machine claimed to be the only one which trims, inspects, reverses, transports and selects seamless hose automatically in one operation. Also shown by this firm is an entirely new electronic device designed to ensure the most economic production of ladies' seamless hose.

Constructed to give high output with relatively unskilled operators, are the latest varieties of over-edging machines and new button sewers, the latter equipped with automatic feeding devices for both flat and shank buttons. Machinery for the production of smallwares is a feature of the exhibition, and on view for the first time is a new multi-shuttle ribbon loom for high speed semi-automatic narrow fabric production. This loom is reported to have a number of entirely new mechanical principles.

INCREASED LEVY FOR WOOL RESEARCH

THE trade associations in the wool textile industry have agreed to an increase in the statutory levy for scientific research and the Wool Textile Delegation has accordingly asked the Board of Trade to take steps to secure Parliamentary approval for the necessary amendments to the Wool Textile Industry Scientific Research Levy Order. The effect of the increased rates will be to yield an estimated £50,000 more a year. A large part of this sum will be needed by the Wool Industries Research Association, Leeds, to enable it at least to maintain the present level of its research activities on behalf of the industry. This is partly due to increased costs, but also to the introduction of new conditions of grant by the Department of Scientific and Industrial Research (the Government Department which makes annual grants to such bodies as W.I.R.A.). Henceforth the industry will have to make a bigger contribution in order to qualify for assistance from this source. The larger total funds should also make it possible for more financial help to be given for approved research projects in textile departments of universities and colleges of technology. Since the last increase four years ago the levy has yielded on average £185,000 a year. It is administered by the Wool Textile Research Council, a body representative of the whole industry and including trade union representatives, scientists and others. The Wool Textile Delegation hopes it will be possible for the amending Order to be approved and put into effect from April 1, 1962. This would mean that the first collection at the new rates would be made as from October 1 next year.

WOOL TEXTILES A "DYNAMIC" INDUSTRY

"THE Government's decision to apply for membership of the European Economic Community has led to a great deal of national stocktaking, and politicians, economists, journalists and others have been drawing up balance-sheets

of what, in their opinion, are the industries likely to gain from Britain's entry into the Common Market and which are likely to lose" reports the latest issue of *Wool Textile Bulletin*. "It is gratifying to note" says the Bulletin "that wool textiles are, by unanimous vote, among the beneficiaries. As an industry it has been variously described as an "export leader", "dynamic", "well able to stand up to Continental competition", and so on. The Bulletin refers to an article in the *Financial Times* Review of British Industry a few weeks ago, by Mr. Graham Hutton, the economist in which he placed wool textiles among the leading export industries, in a table reproduced herewith—

Export Leaders and Laggards
Prices in 1960 are roughly 3½ times those in 1938 (£ million)

	1960	1950	1938
"Dynamic" Lines			
Beverages	76	31	13
Other food	75	10	7
Wool, etc.	156	147	29
Petroleum, etc.	104	17	5
Chemicals	317	141	30
Rubber, etc.	44	26	5
Iron and Steel	216	104	30
Base-metals	98	52	10
Metal manufactures	158	106	24
Machinery	712	298	51
Electrical machinery	234	137	22
Aircraft and vehicles	505	269	23
Scientific instruments	49	21	3
Other manufactures	154	77	14
"Static" Lines			
Coal, coke, etc.	28	61	41
Cottons, etc.	63	140	45
Ships and boats	52	42	9
Leatherware, etc.	23	20	6
Man-made fibres	29	44	4
Miscellaneous textiles	83	90	22
Rail vehicles, etc.	20	32	8
Clothing, etc.	48	49	11
Tobacco	18	19	5

The Bulletin points out that it would not be correct to give the impression that everybody in the wool textile industry would benefit from this country's linking up with the Common Market. As in a number of other British industries, there are firms—and indeed, sections—which would undoubtedly find difficulty in meeting intensified competition from producers in E.E.C. member-countries. The most obvious example is our medium to low woollens, which in recent years have been hit by the cheap manufactures of the Prato district of Italy, where producers have the advantage of certain factors peculiar to that district, such as the system of cottage weaving, In general, however, the industry may be expected to gain from free access to the Common Market. In the last three years the value of its sales of wool tops, yarn and cloth to the E.E.C. countries (and notably Western Germany) has averaged £26 million annually or only a little less than the £27 million worth sold to the British Commonwealth countries granting preferential rates. The Industry therefore has a big stake in the forthcoming negotiations between the U.K. and the Community.

£600,000 TWEED MILL IN SCOTLAND.

THE first complete new tweed mill to be built in Scotland for many years was opened by Wilson and Glenny Ltd., Hawick, on October 2. Replacing the old mills destroyed on the site in 1959, it has cost £600,000. The firm handles the whole process of woollen cloth manufacture and the major consideration in planning the new mill has been to ensure efficient progress flow so that virtually, raw wool enters at one end and cloth emerges at the other. Great care has been taken also to meet other requirements including levels to suit loading bays; appropriate structures to suit modern machinery, compatible with the comfort and convenience of employees; thermal insulation; proximity to essential services; elevation features appropriate to the contours of the site and landscaping.

The new mill is claimed to be as modern, efficient and well equipped as any in Britain. The carding and spinning shed covering an area of more than 35,000 sq. ft. consists of six insulated bays with a North light, cantilever boom, aluminium-clad roof. Both it and the smaller preparatory and weaving shed have complete automatically-controlled air conditioning. Another giant shed contains the scouring drying, dyeing and blending departments. Around the perimeter of the main sheds, a two-storey building houses a 22,000 sq. ft. wool store, a yarn store, working offices and pattern department, the air-conditioning plant, quality control, batch stores, power house, mechanics' workshop, etc. Fullest use has been made of a difficult site without recourse to different ground-floor levels.

The general offices, warehouses and showrooms have been built into the former wool store and are connected with the new mill by a bridge. A second bridge links them with the wet and dry finishing departments. Maximum use is made of mechanical handling.

[HARRY CHEETHAM BARNES

We regret to record the death on September 9, at the age of 64 years, of Harry Cheetham Barnes, "Beaconhurst", Netherton, Frodsham, Cheshire, who was for over 17 years (1927-45) Editor of this journal. A man of unusual ability, his early plans as a youth to enter the Civil Service were completely altered when the first world war broke out. He quickly volunteered for service, was commissioned on the field in the Royal Artillery and later promoted to the rank of lieutenant. Following demobilisation he studied for and was awarded the degree of Bachelor of Science (Tech.) at Manchester College of Science and Technology, and also gained the degree of Bachelor of Commerce (Lond.) Always intensely interested in education and, in particular, textile technology, he accepted a post as full-time lecturer in weaving and allied subjects at Burnley Technical College. A few years later—in 1927—he was appointed Editor of "Textile Manufacturer" and in 1937 a director of Emmott and Co. Ltd., publishers of the journal. He resigned both these posts in 1945 to join the Cotton Board where, for three years, he did valuable work connected with the Recruitment and Training Department. His final move was to join Shell Research Ltd., Ellesmere Port where he worked as a technical editor for 10 years.

Well-known throughout the textile industry for his readiness to help or advise wherever possible, Mr. Barnes will best be remembered by many for his untiring efforts to further the interests and activities of the Textile Institute. Joining as member in 1927, he became an Associate in 1932 and served on several committees including, Council 1931-48; Textiles and Designs 1931-48; "A", "B" and "C" Competitions 1939-48; Reference Collection Sub-Committee 1936-48 (chairman 1938-48); Institute Development 1935-48; Lancashire Section (chairman 1936-38 and secretary 1944-48); Scholarships 1943-48; Textile Terms and Definitions 1943-48; Joint Committee with the S.D.C. 1944-48; Joint Committee re National Certificate in Textiles 1945-48. In recognition of this long and varied service he was awarded the Institute Service Medal in 1949.

The owner of a small farm for many years, he was extremely interested in studies of plant life, crop raising and agricultural methods in general, and retirement in 1958 gave him much more time to experiment and carry out, very successfully, some of the theories he held on these subjects.

Producing Bedspreads Woven on Terry Principles

Designing, card-cutting, drawing-in and weaving particulars including counts of warp and weft, ends and picks and finished dimensions of the various sizes

By T. HARGREAVES

POPULAR in the U.S.A. for some time now, these novel bedspreads have also been well received by British and Continental housewives desiring a distinct change from the alhambra type of quilt or candlewick patterns. This type of bedspread, known in the U.S.A. as "Colonial," "Heirloom" or "Early American" is characterised by thick, curly loops greatly resembling "tufts," and woven on a "plain weave" ground fabric; the loops or tufts form the desired pattern on the face of the cloth. Unlike machine needled tufts these loops must of necessity be woven on the underside of the fabric, when not required in the face pattern and that, of course, is the principle of all three-pick terry weaves, i.e. basic weave, plus modifications.

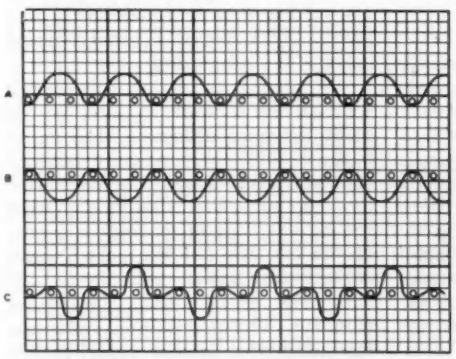
These bedspreads are manufactured in several qualities. One pattern has about four of the singly formed loops per in. across the width and two singly formed loops per in. of length; this quality we call a 4×2 quality. Another is a 4×3 quality and a better quality still is 4×4.

The yarns forming these singly formed loops are thick, soft and curly, e.g. 3/3s, 6/8s. and sometimes a three-ply soft cotton roving is used. The ground warp is 2/30s cotton and the weft varies from 14s single to 20s single.

These "Colonial" spreads are woven in "king size" which will actually cover two twin beds (130 in. reed space looms), "double bed size" (110 in. reed space) and in narrower widths for threequarter and single beds. The 95 in. loom state fabric is a very useful width for the double bed size. These spreads are afterwards bleached, dyed, or wash finished and these treatments reduce the width by about 5%. Many of them have fringe stitched on to all four sides. These fringes, made by special machinery in the smallwares trade, bring the original 95 in. width less 5% shrinkage wash finished to over 100 in. finished width. The loops or tufts are so bound into the fabric that they stand out in clear relief.

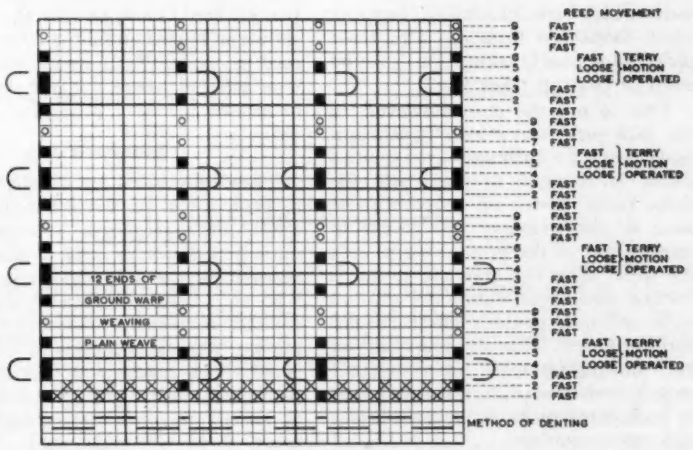
In normal three-pick terry weaving, with interchanging face and back loops, the loops do not float over or under two picks which is necessary for the formation of perfect loops. The arrangement is shown in A, B and C in Fig. 1.

The normal three-pick terry loop is shown at A on the face of the fabric, with each loop floating over two picks. B shows the normal terry loop woven on the underside where each loop floats under two picks. C shows the loops alternating from face to underside and conversely. The floats for all loops are only over or under one pick. The alternating loops thus formed are not clear and distinct.



LOOP FORMATIONS IN A NORMAL THREE PICK TERRY WEAVE
A = ALL LOOPS ON THE FACE, EACH FLOATING OVER TWO PICKS
B = ALL LOOPS ON UNDERSIDE, EACH FLOATING UNDER TWO PICKS
C = LOOPS ALTERNATING FROM FACE TO UNDERSIDE AND VICE-VERSA
NOTE THAT THE ALTERNATING LOOPS IN 'C' DO NOT HAVE A TWO PICK FLOAT. FOR PERFECT LOOP FORMATION THE FLOAT OVER OR UNDER TWO PICKS IS NECESSARY.
IN DESIGNS FIGS. 2-3-6 THE TWO PICK FLOAT IS MAINTAINED WITH ALL LOOP FORMATIONS.

Fig. 1



■ = LIFTING OF PILE WARP ENDS WHEN WEAVING NORMAL TERRY WEAVE
⊠ = BINDERS LIFTING PILE WARP ENDS ON ALMOST PLAIN WEAVE BETWEEN LOOPS
⊠ = LIFTING OF GROUND WARP WEAVING PLAIN BETWEEN THE SINGLE ENDS OF PILE WARP
C = POSITION OF 'TUFTED' LOOP WHEN ON FACE OF CLOTH
Ɔ = POSITION OF 'TUFTED' LOOP WHEN ON UNDERSIDE OF CLOTH
— = ONE END OF PILE WARP IN A WIDE DENT EQUAL TO 10 DENTS PER INCH REED. 2-70/3 PLY COTTON ROVING
— = FOUR ENDS OF GROUND WARP IN A NORMAL 20 DENTS PER INCH REED
A DOUBLE LIFT-DOUBLE CYLINDER JACQUARD USED FOR THE PILE ENDS, ONE PATTERN CARD FOR EACH PICK.
GROUND WARP WOVEN BY CAM OPERATED HEALDS
18 PICKS PER INCH, 14^s TO 20^s WEFT

Fig. 2

To remedy this construction fault when weaving the singly formed loops in tufted loop bedspread fabrics the normal three-pick terry weave has been modified to a nine-pick terry weave; one loop, produced in each nine picks. Two repeats of the normal three-pick terry weave, which weave either a loop on the face or underside, form the first six picks of this nine-pick series. The remaining three picks, in each series of nine, are binder picks, made to lift in as near plain weave order as is possible, having regard to the correct binding of the terry loops. This weave is used for the 4×2 quality.

The singly formed loop is formed over or under the 3rd and 4th picks in each series of nine picks. The 4th and 5th picks are held back by the movement of the reed under control of the terry motion, and when the 6th pick has been inserted, the three picks are beaten-up together to the fell of the cloth to form the loop.

On the 1st, 2nd, 3rd, 7th, 8th and 9th picks in each series, the reed is locked in the beat-up position, and each pick beaten-up separately to weave the almost plain weave of the pile ends between the loops. Between the vertical lines of terry pile warp forming the single loops are twelve ground ends. These weave plain and form the basic material of the bedspread, separating the loops widthways.

The standard ground weave for three-pick terry fabrics is a 2×1 rib and this weave has only one point of intersection with the three picks of weft which are beaten-up together when loops are formed. The three picks slide easily along the ground warp as beat-up takes place.

This is not the case, however, in the nine-pick heavy loop bedspread. Instead of a 2×1 rib weave the ground weave is changed to plain and the three picks beaten-up together now have to slide against two points of intersection of the ground warp with the weft. This can give rise to much friction and strain upon the ground ends and may possibly cause ground end breakages. This strain is offset by only beating-up three picks together once in each nine picks, instead of once in each three picks as in basic three-pick terry weaving.

Using a plain weave for the ground in place of the 2×1 rib weave, it is possible to reduce the number of picks per in. and yet preserve firmness in the ground structure. With a 2×1 rib weave for the ground the picks per in. would probably be between 27 and 36 per in., but in this nine-pick basic terry weave employing a plain ground weave the picks can be reduced to 18.

Special Reed

A further problem in weaving this class of bedspread is the thickness and softness of the pile warp ends. Soft, thick yarns of this type will have difficulty in passing through the normal reed dents and undue friction will chafe the yarn and break many pile warp ends.

On the other hand the 2/30s ground warp, of course, requires a fine reed and to meet these special conditions a special type of reed is employed having widely spaced dents for the thick pile yarns and normal dents for the ground warp.

In the details of Fig. 2—which is for the 4×2 quality spread—12 ground ends are weaving plain weave. On each side of these 12 ground ends is one single end of the thick pile warp which forms the loops. Each pile end is set $\frac{1}{4}$ in. apart from the next pile end.

If a 24 dents/in. reed is used the 12 ground ends will be drawn three ends per dent. Then a very wide dent, equal to 12 dents/in., or two dents of the normal 24 dents/in. reed is used for the single end of 2 - 70/three-ply soft pile yarn. Total dent space used is six dents or 6/24 of a 24 dents per in. reed, i.e. $\frac{1}{4}$ in. Alternatively, a 20 dent/in. reed may be used, e.g. 12 ground ends at four per dent, then the pile end in a wide dent is equal to two dents of the 20 dents/in. reed; total five dents in all or 5/20 of a 20 dents per in. reed, i.e. $\frac{1}{4}$ in. In the layout shown in Figs. 2 and 3 the 20 dents/in. reed is used. With every fifth dent wire omitted where the pile ends will be drawn.

Jacquard

These pile loops are usually woven in geometrical or floral designs with a full harness jacquard. The mail eyes must be sufficiently large to allow free passage for the soft, thick pile yarns. The very width of these bedspreads sometimes creates a problem in selecting the type of jacquard to be used. A 400-hook machine with a straight tie would control 400 pile ends but, as these pile ends are spaced $\frac{1}{4}$ in. apart, these 400 ends would occupy 100 in. in the comberboard. This width plus selvedges—each $\frac{3}{4}$ in. wide—will give a yarn spread in the reed of $101\frac{1}{2}$ in. which would give about 95 in. of loom state fabric. The extreme angle of the harness lines from the jacquard to the sides of this wide fabric might need glass rods or necks below the jacquard to keep the pull on the hooks as straight as possible.

Alternatively two 200-hook machines set in tandem could be used. Each jacquard would control half the width of the fabric and this arrangement would keep the harness lines at moderate angles. It is not unknown to use two 400-hook machines in tandem and, for king size bedspreads with fancy border patterns, in addition to a fancy centre pattern, two 600-hook machines have been used in tandem. These jacquards are double lift, double cylinder type and the comberboard only needs two rows of holes set with $\frac{1}{4}$ in. spacing between alternating holes or 4 per in. The ground ends are carried in heald frames operated by tappets.

Basic details of the weave for the 4×2 quality bedspread are given in Fig. 2. It shows how and where the terry loops are formed on the face, underside, or alternating from face to back or conversely. It will be observed that the binder weave for the pile ends occupies varying positions, depending on whether the loops are on the face, underside, or alternating. This is the only way to weave as near plain weave as possible between the loops in each nine picks, if we are also to lock the loops in position. It will be noticed that all these singly formed loops float over or under two picks of weft.

A bedspread with 18 p.p.i., and 120 in. long, will need a total of 2,160 cards or 1,080 on each cylinder of the double cylinder, double lift machine. Every pick of the 2,160 needs transferring to design paper for cutting of the cards and this in itself is no small job. It is not necessary to put the plain ground weave on this design for cutting the cards. Just the 100 vertical lines representing the pile ends $\times$ 2,160 picks; a panel type of design for card cutting.

To balance the design to suit this 4×2 quality it would be advisable to paint the loop design on 4×6 ruled paper to show the position of the face and underside loops, then transfer this to the panel design for card cutting and to add the binder weave on the 7th, 8th and 9th picks in each series of nine picks.

In Fig. 3 the design has been modified. The modification consists in sacrificing the almost plain binder weave between the singly formed terry loops. Instead, the weave used is the normal three-pick terry weave *but* with no change of loop position until three repeats of the normal terry weave, or nine picks have been woven. The loop may change from face to back, or

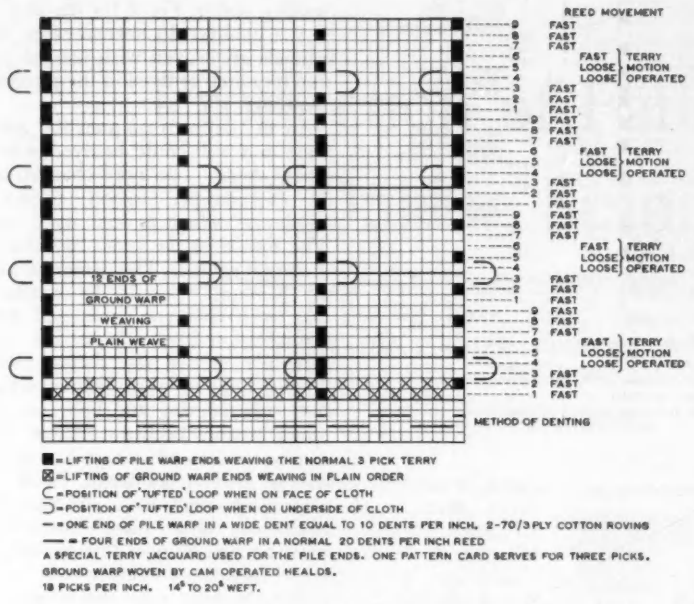

REED MOVEMENT
FAST
TERRY MOTION OPERATED
LOOSE
18 ENDS OF GROUND WARP WEAVING PLAIN WEAVE
METHOD OF DENTING
■=LIFTING OF PILE WARP ENDS WEAVING THE NORMAL 3 PICK TERRY
⊠=LIFTING OF GROUND WARP ENDS WEAVING IN PLAIN ORDER
⊂=POSITION OF 'TUFTED' LOOP WHEN ON FACE OF CLOTH
⊃=POSITION OF 'TUFTED' LOOP WHEN ON UNDERSIDE OF CLOTH
— = ONE END OF PILE WARP IN A WIDE DENT EQUAL TO 10 DENTS PER INCH, 2-70/3 PLY COTTON ROVING
—— = FOUR ENDS OF GROUND WARP IN A NORMAL 20 DENTS PER INCH REED
A SPECIAL TERRY JACQUARD USED FOR THE PILE ENDS. ONE PATTERN CARD SERVES FOR THREE PICKS.
GROUND WARP WOVEN BY CAM OPERATED HEALDS.
18 PICKS PER INCH. 14⁵ TO 20⁵ WEFT.

Fig. 3

conversely but there must only be one loop in each nine picks. These loops are formed over or under the 3rd and 4th picks in each series of nine picks. The terry motion holds the reed back on the 4th and 5th picks and along with the 6th pick beat-up to form the terry loops. All other picks in each series of nine are beaten-up as they are inserted.

There is a slight loss of firmness where the pile ends are bound into the cloth between the woven loops. This slight loss of firmness is offset by the following advantages:—

(1) **Transferring the design to point paper is made much easier.**
(2) **A special terry jacquard (one card to three picks) may be used.**
(3) **This will reduce the lines needed on the design paper to one line for each three picks instead of one line per pick.**
(4) **Reduce the pattern cards to 720 from 2,160.**
(5) **Only one cylinder in this jacquard will obviate "off pick" troubles caused by failure of synchronisation between the two cylinders of the double lift - double cylinder jacquard or between terry motion and jacquard.**
(6) **Simplify the weaving technicalities for the weaver and the loom overlooker.**

Fig. 4 shows how simple it is to paint the design on four widthways × six lengthways ruling of design paper is shown. Only one loop—black area —appears in each three bars or nine picks of the basic weave. The cutting instructions are equally simple to follow. A hole is punched in the card for each black square and the terry motion operated, or left blank for unpainted squares with the terry motion operated if these unpainted squares are in the same line as the black squares:—

Black squares = Terry loop on face. Punch hole. Operate terry motion.
Unpainted squares = Terry loop on underside when in same line as black squares. Do not punch hole. Operate terry motion.
"X" = Weave for terry loop on face but terry motion not operated and no loop is formed. Punch hole.
Unpainted squares when in same line as "X" = Weave for terry loop on underside but terry motion not operated and no loop is formed. Do not punch hole.

Fig 5 shows the loop pattern formed on the face by the design in Fig. 4. The loops are represented by small circles. This is equal to a 3½ in. × 3½ in. pattern swatch. The loops are four to the in. widthways × two loops per in. lengthways or 4 × 2 quality. A similar formation of loops takes place on the underside indicated by all blank squares that are in a horizontal line with the squares containing small circles.

Some special terry jacquards (one card to three picks) push on - push off type have a hole punched to give a terry loop on the face on odd-numbered terries and left blank to produce a loop on the face on even-numbered terries (see article on Terry Jacquards, "T.M.", Nov. 1960, page 432). In such cases the above cutting instructions need to be adjusted accordingly.

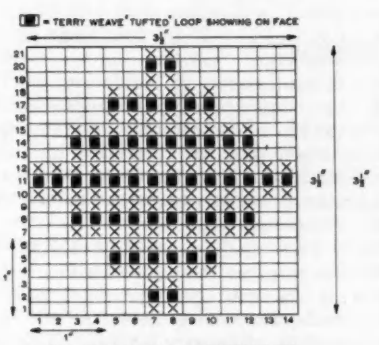

■ = TERRY WEAVE 'TUFTED' LOOP SHOWING ON FACE
3½"
4 X 6 SQUARES PER INCH RULING OF DESIGN PAPER FOR 4 X 2 QUALITY TERRY WEAVE 'TUFTED' BEDSPREAD BASED ON 9 PICK TERRY DESIGN SHOWN IN FIG. 3
EACH HORIZONTAL LINE = 3 PICKS

Fig. 4

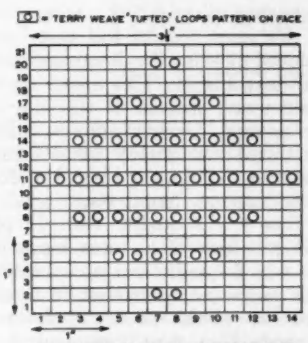
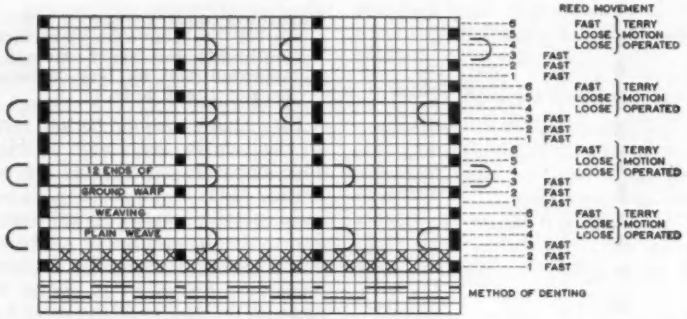

⊡ = TERRY WEAVE 'TUFTED' LOOPS PATTERN ON FACE
3½"
4 X 6 SQUARES PER INCH RULING OF DESIGN PAPER FOR 4 X 2 QUALITY TERRY WEAVE 'TUFTED' BEDSPREAD THE ⊡ REPRESENT THE PATTERN AND LOOP SPACING IN A 3½" SQUARE SWATCH

Fig. 5

PATTERN CARD CUTTING INSTRUCTIONS FOR SPECIAL TERRY JACQUARD
ONE PATTERN CARD SERVES FOR THREE PICKS
■ CUT HOLE IN CARD. OPERATE TERRY MOTION ON THESE THREE PICKS
⊠ CUT HOLE IN CARD. DO NOT OPERATE TERRY MOTION ON THESE THREE PICKS
□ LEAVE BLANK. DO NOT CUT HOLE IN CARD.
OPERATION OF TERRY MOTION GOVERNED BY ■ OR ⊠

The examples given in Figs. 2 and 3 are for fabrics containing four loops per in. widthways and two loops per in. lengthwise or 4 × 2 quality. These are the cheapest to manufacture and possibly contain the lowest number of loops per sq. in. that can be used in this class of bedspread and yet show the pattern to advantage.

To weave a 4 × 3 quality the methods given in Fig. 2 or Fig. 3 can be used, but the picks per in. must be changed to 27 in order to give three loops per in. lengthwise; 9 × 3 = 27.



■ = LIFTING OF PILE WARP ENDS WEAVING THE NORMAL THREE PICK TERRY
⊠ = LIFTING OF GROUND WARP ENDS WEAVING IN PLAIN ORDER
⊂ = POSITION OF 'TUFTED' LOOP WHEN ON FACE OF CLOTH
⊃ = POSITION OF 'TUFTED' LOOP WHEN ON UNDERSIDE OF CLOTH
— = ONE END OF PILE WARP IN A WIDE DENT EQUAL TO 10 DENTS PER INCH. 2-70/3 PLY COTTON ROVING
—— = FOUR ENDS OF GROUND WARP IN A NORMAL 20 DENTS PER INCH REED
A SPECIAL TERRY JACQUARD USED FOR THE PILE ENDS. ONE PATTERN CARD SERVES FOR THREE PICKS.
GROUND WARP WOVEN BY CAM OPERATED HEALDS.
18 PICKS PER INCH FOR 4 X 3 QUALITY
24 PICKS PER INCH FOR 4 X 4 QUALITY
14^{s} TO 20^{s} WEFT
TAKE CARE THAT THE TERRY MOTION OPERATES ON THE 4TH, 5TH AND 6TH PICKS, WHICH ENSURES EACH LOOP FLOATING OVER OR UNDER TWO PICKS.
IF OPERATED ON THE 1ST, 2ND AND 3RD PICKS IN EACH SERIES OF SIX PICKS THE LOOPS WOULD ONLY FLOAT OVER OR UNDER ONE PICK, WHEN ALTERNATING

Fig. 6

This 4 × 3 quality will be much heavier than the 4 × 2 quality as there are 50% more loops and 50% more picks than in the 4 × 2 quality. Some of this extra weight and cost can be reduced by using the designing method shown in Fig. 6. This uses a six-pick basic weave instead of the nine-pick basic weave. Using the design in Fig. 6 for this 4 × 3 quality enables one to revert to 18 p.p.i., e.g. 6 × 3 = 18 for three loops/in. lengthwise.

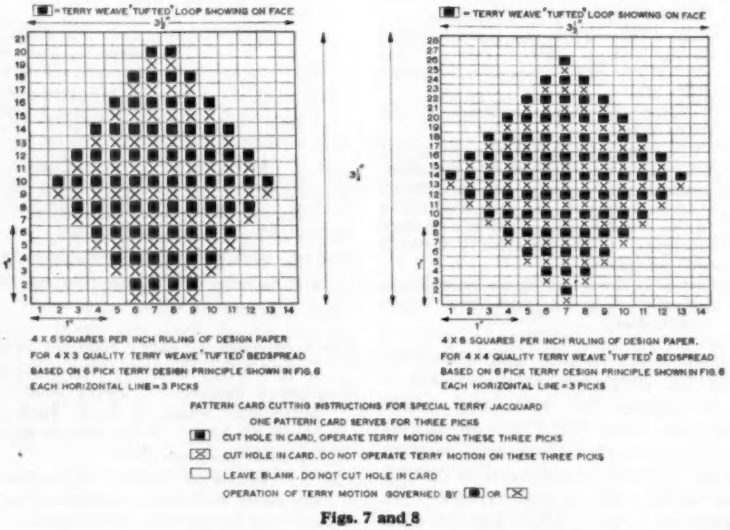
This 4 × 3 quality with 18 picks will still have 50% more loops than the 4 × 2 quality but no increase in total picks and no increase in weaving time as would occur if designing methods Figs. 2 or 3 were used. If, however, the Fig. 6 method was used for 4 × 2 quality, the picks would then be insufficient for the stability of the fabric, e.g., 6 × 2 = 12 picks per in. to form two loops lengthwise. With the Fig. 6 method of designing for the 4 × 3 quality with 18 picks per in. design paper should be used ruled six squares per in. lengthways and four per in. widthways. This Fig. 6 method is suitable for weaving by the special one-card-to-three-picks terry jacquard.

To weave a 4 × 4 quality using the designing methods of Figs. 2 or 3 the picks must be raised to 36 per in. This doubles the number of picks, also doubling the number of loops per sq. inch. compared to the 4 × 2 quality. It is certainly a better quality but much more costly. As weaving troubles may occur with 36 p.p.i. on a plain ground weave, it may become necessary to change the plain weave to a 2 × 1 rib or a 2 × 1 twill weave. However, by using the Fig. 6 method the plain ground weave can be maintained, and woven with only 24 p.p.i., e.g. 4 × 6 = 24 for four loops per in. lengthwise. For this, use 4 × 8 ruled design paper, 6 × 12, or 8 × 16 according to the type of jacquard being used. The operation of the terry motion may be controlled by other mechanisms on the loom, whichever may be most convenient to suit the design.

The method of transferring to design paper the weave used in Fig. 6 for the cutting of jacquard pattern cards, when using the special one card to three picks terry jacquard, is shown in Fig. 7 for the 18 p.p.i., 4 × 3 quality, and in Fig. 8 for the 24 p.p.i., 4 × 4 quality. In normal cases, these spreads are woven with natural yarns and bleached or dyed in the piece after weaving.

In the author's opinion the ground warp and weft could be dyed, say in a pastel shade. The loops changed from 2 - 70/three-ply cotton roving to "Coloray" which is dope dyed rayon. The dye is in the basic material and is evenly spread. The denier and type of "Coloray" should be similar to that used for tyre yarns and which resemble roving. These are made three-ply as for the cotton roving. These "Coloray" yarns, extraordinarily fast to laundering and light, are produced in many beautiful shades. They can be used to advantage in two-tone effects when combined with the coloured ground weave, and the spread could be sold loom state when hemmed and fringed. All these terry weave bedspreads are woven in the U.S.A. by fully automatic looms, one weaver attending six looms.

SURVEY OF A CHEMICAL GROUP. This very interesting new book, published by Albright and Wilson Ltd., 1 Knightsbridge Green, London, S.W.1, gives a comprehensive account of the character and activities of the Albright and Wilson Group of chemical companies as it is today. The book shows how a number of companies, each with its own chronicle of success, have integrated to make the Group a rapidly expanding organisation whose diverse fields of operation are world wide. Representative of a Group with a forward-looking policy, the book only briefly sketches past history and concentrates on the present organisation, its services and products.


■ = TERRY WEAVE 'TUFTED' LOOP SHOWING ON FACE
3½"
3½"
1"
1"
4 X 6 SQUARES PER INCH RULING OF DESIGN PAPER FOR 4 X 3 QUALITY TERRY WEAVE 'TUFTED' BEDSPREAD BASED ON 6 PICK TERRY DESIGN PRINCIPLE SHOWN IN FIG. 6 EACH HORIZONTAL LINE = 3 PICKS
■ = TERRY WEAVE 'TUFTED' LOOP SHOWING ON FACE
3½"
3½"
1"
1"
4 X 6 SQUARES PER INCH RULING OF DESIGN PAPER. FOR 4 X 4 QUALITY TERRY WEAVE 'TUFTED' BEDSPREAD BASED ON 6 PICK TERRY DESIGN PRINCIPLE SHOWN IN FIG. 6 EACH HORIZONTAL LINE = 3 PICKS
PATTERN CARD CUTTING INSTRUCTIONS FOR SPECIAL TERRY JACQUARD
ONE PATTERN CARD SERVES FOR THREE PICKS
■ CUT HOLE IN CARD, OPERATE TERRY MOTION ON THESE THREE PICKS
⊠ CUT HOLE IN CARD, DO NOT OPERATE TERRY MOTION ON THESE THREE PICKS
□ LEAVE BLANK, DO NOT CUT HOLE IN CARD
OPERATION OF TERRY MOTION GOVERNED BY ■ OR ⊠

Figs. 7 and 8

Production of Fancy Yarns During Spinning

The various methods, simple arrangements and special motions employed in making flake, gimp, slub, core, corkscrew and similar fancy effects during drafting, spinning and doubling operations

By N. PRIMENTAS

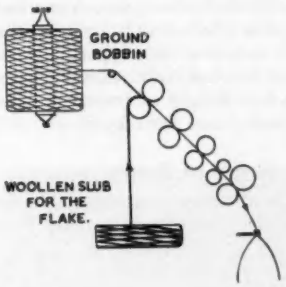
SOME fancy yarns such as gimp, corkscrew, snarl, variable spun, covered, slub, splash, core, mock chenille, etc., can be produced on spinning frames by employing differing techniques and devices to give the effect. It is relatively easy to arrange either continuous, intermittent or varying speed delivery of the roving just before it is spun into a yarn and, by combining these methods of roving feeding with devices to control other yarns, many more varieties of fancy yarns can be made.

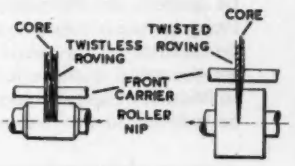
Continuous Roving Feeding

Splash Yarn.—This is a variation of the flake type single yarn and is produced by feeding two rovings of mostly contrasting colours and different fibre length, to the front roller of a spinning frame as indicated in Fig. 11. The thickness of the roving forming the main yarn is proportional to the percentage of ground required in the final yarn. The roving for the splash, lighter in weight than the ground roving, is made from short staple fibre and, in the case of twisted rovings, the twist must be the minimum workable. An increased draft can be imposed to the rovings, as regularity is not of first importance for this type of yarn, to ensure a better distribution of the fibre clusters of the effect roving. The ratch of the front roller to the first carrier roller controls, to some extent, the size of the flake detached and, therefore, it should be recorded together with the other particulars for later reference.

Core Yarn.—This type of yarn is made by combining the drafted fibres of a roving with either a continuous filament, or a single, or two-fold spun yarn at the nip of the front roller.[13] The components are issued as a single yarn in which the filament or the spun yarn fed assumes an axial position whilst the roving fibres are wrapped around and cover it completely. The resultant yarn has good strength and soft handle due to the reduced amount of twist employed in spinning.

For making core yarns a special attachment is not necessary at the spinning frame. Some arrangements should, however, be made for creeling the core yarn packages because spinning frames are not usually provided with extra pegs, apart from those required for the roving bobbins. Replacing of half of the bobbins by the core packages is impractical as this would reduce the production of the frame. In some types of creels it is possible to accommodate the core packages between the roving bobbins. This is preferred to the former method, although the diameter of the roving bobbins must be smaller to provide





(above) Fig. 12. Arrangement of twistless roving and core

(left) Fig. 11. Feeding two rovings of different colours for splash yarn

room for the core package. Wherever long runs of the spinning frame are expected, an additional home-made creel can be placed at some convenient position and in cases like this yarn tension devices might prove useful on such assembly.

The relative position of the core to the issued roving also requires attention. Unless properly guided the core will show at places in the yarn. Matching core colour with roving colour would obscure the fault but this is not always possible. Rovings produced on the Continental system of drawing make more satisfactory core yarns than others, provided covering characteristics are required at the expense

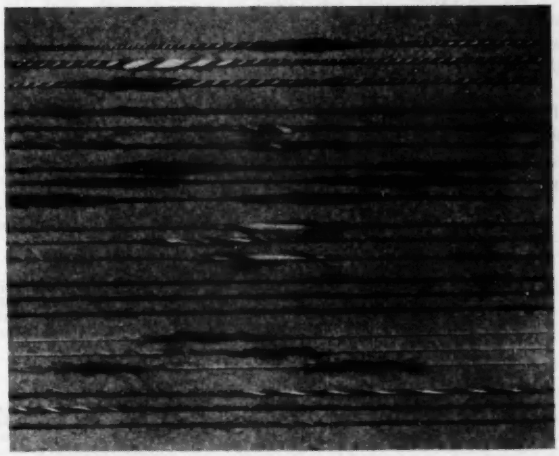


Fig. 13. Display card holding several different samples of spun fancy yarns

of other yarn features. This is, of course, due to the twistless nature of such rovings.

The disposition and arrangement of twistless roving and the core, and its effect on the finished yarn will be easily understood by reference to Fig. 12. The type of the core thread whether continuous filament or spun yarn, single, two-fold, counts and twist are factors for careful consideration.

Success of a core yarn depends directly upon the correct selection of these characteristics. A natural choice is a lean core; the roving fibres can cover it effectively and an obvious answer to this is filament yarn. The thickness of the core yarn varies according to the counts of the yarn used. A fairly common practice in many mills is to employ cores having a weight percentage in the finished yarn fluctuating from 5 - 15%, one example being a 1/30s worsted yarn cored with a 30 den. nylon filament.

In case where the core is a spun yarn its turns per inch and the direction of twist must be carefully studied. On a soft twisted core twist-on-twist can be imposed but with hard twisted cores a twist in the opposite direction must be applied. An alternative to twisted tinsel yarns (discussed later) is to introduce a metallic thread as a core.[14] The precautions to be taken in spinning this type of thread are the same as those for the twisted tinsel yarn with the addition that spindle speeds and weight of travellers must be reduced to avoid unnecessary end breakages.

Intermittent Delivery of Roving

Slub Yarn.—Slub yarn is used extensively as weft, in the manufacture of furnishing and upholstery materials. It is also extremely popular in its many variations. As effect threads in dress goods as it breaks the monotony of plain surfaces and helps considerably in novel weaves. A slub yarn consists of thin and thick places alternating at regular or irregular intervals along its length. Usually the length of the thick portion or slub remains constant, the thin portion or stem being variable. This is effected by arresting momentarily by some convenient method those drafting rollers through which the roving passes. The result is a slub produced at the time when the draft is reduced and the stem is the result of the increased drafting. The difference in thickness between thin and thick portions is further enhanced due to the fact that twist inserted in a strand of fibres does not distribute itself evenly throughout but runs to the smallest portions of the yarn.[15] It becomes of utmost importance therefore to make certain that the twist and draft imposed are correctly assessed to produce a sound yarn. Short fibre materials are usually preferred if a relatively small, well defined slub is desired.

As already mentioned slub yarn is a variable spun yarn. This irregularity is introduced in a roving by stopping for short intervals either the back or front rollers of the drafting zone in the frame. When the back rollers come to a rest the front rollers continue to draft the roving and it is in this period that the fine portion or stem between the slubs is made. Because of its simplicity this method has enjoyed wide popularity but it has one objectionable drawback in that it gives no precise control over the length of the stem. The length of the stem depends largely on the stoppage period of the back roller and this imposes limitations based on the thickness of the roving and its fibre length; when the stoppage is too long the continuation of the yarn is interrupted. However, the introduction of an additional thread at the nip of the front roller (core thread) will enable the time the back roller is stopped to be increased and when this happens the slubs in the yarn will be more widely interspersed. This method offers more control over the length of the slub made but there are always limits to observe in slub yarn manufacture techniques, determined in all cases by the fibre length of the roving.

The intermittent motion of the back rollers causes a variable unwinding of the roving bobbins. When the roller revolves it draws the roving which, in turn, rotates the supply bobbin. Suddenly the roller comes to a standstill but the lightly supported supply bobbin continues to revolve for an instant or two, unwinding the roving which falls between the guide bar and the bobbin peg. When this occurs and the back roller restarts there is a strong possibility of the roving being snatched and broken. To obviate this danger small tufts of fibres are sometimes placed in the creel porcelains and skewer points have been blunted in efforts to maintain control.

Intermittent drive to the front roller was introduced to overcome some of the disadvantages cited. The back and carrier rollers rotating continuously present the roving to the nip of the front roller at a predetermined speed necessary to produce the stems of the required thickness when the front roller is put into motion. The front roller is arrested in its movement through the medium of the slub motion device whilst the other rollers continue to feed the roving to its nip. A certain amount of roving is deposited at the rear of the front roller during this period which is delivered collectively as soon as the front roller assumes its movement.

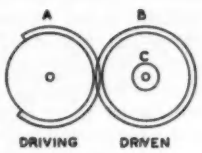
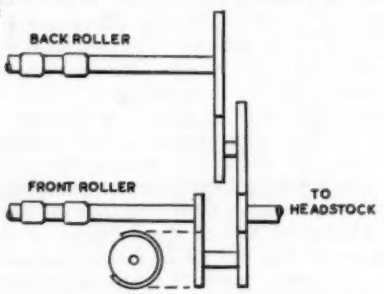
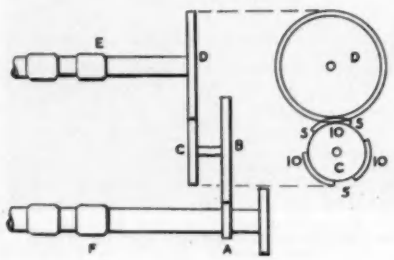


Fig. 14. Intermittent but regular sized slubs are made by employing gears having gaps at fixed distances in the teeth

Intermittent Slubbing Motions

The forerunner of all intermittent delivery motions for the production of slubs, knops and other discontinuous effects on fancy yarns was undoubtedly that obtained by





(right) **Fig. 16. Intermittent front roller drive by cut gearing**

(left) **Fig. 15. Gearing and drafting rollers of worsted spinning frame set to produce slubs 3½ in. long**

A Front roller wheel (30)
B Stud wheel (150)
C Draft change wheel (45)
D Back roller wheel (60)
E Back roller (1 in. diameter)
F Carriers
G Front roller (1 in. diameter)

the use of gears with the teeth spaced or cut-off in various ways. In Fig. 14 the two wheels A and B are in gear but the driver A has had some teeth removed and in rotating it will turn B normally up to its last tooth. During this intermeshing period the delivery roller C issues a length of roving depending on the time of engagement and on the diameter of roller C. When the gears cease to mesh, wheel B and roller C come to a rest for a period determined by the number of teeth absent on A.

The application of the cut wheel principle may be gathered more conclusively by reference to Fig. 15, showing the gearing and drafting rollers of a Continental worsted spinning frame, set to produce slubs 3½ in. long occurring at regular intervals on the issued yarn.

The draft change wheel C is designed to have every 10 teeth followed by a space normally filled with 5 teeth; when its teeth was engaged with the teeth of the back roller D a draft of $\frac{\pi \times 150 \times 60}{30 \times 45 \times \pi} = 6\frac{2}{3}$ is imposed on the fed rovings.

The drafting lasts for $\frac{10}{45}$ of a revolution of the draft change wheel, or the length of the yarn issued at this period is equal to: $\frac{150}{30} \times \pi \times \frac{10}{45} = 3\frac{1}{2}$ in.

If a blank of the triple cut wheel comes against wheel D, this ceases to rotate and with it the back and carrier rollers. The duration of the stoppage is equal to $\frac{5}{45}$ of a revolution of wheel C in which period a rapidly increased draft is applied to the rovings resulting in a fine portion on the yarn equal to $\frac{150}{30} \times \pi \times \frac{5}{45} = 1\frac{3}{4}$ in. long. The operation is repeated to produce a periodically drafted yarn.

The idea may appear simple and easy to apply to existing spinning frames in that it avoids the expense of buying special slub motions or even whole machines designed for the purpose. On the other hand practice has clearly shown that the use of cut wheels is undesirable and often uneconomical for the following reasons:—[16] [17]

(1) The flexibility of the spinning frame is limited because each cut wheel is prepared for a particular size of slub and it is most unlikely that it can be used for another yarn; still it has to be kept in case a repeat order comes along thus increasing the stock of cut wheels.

(2) Random spaced slubs which do not produce "patterning" or "grouping" are often desirable and cut wheels cannot be usefully employed for this purpose.

(3) Mechanically the assembly of spaced wheels is not sound. The first tooth of the driving wheel comes suddenly into contact with the tooth of the driven wheel. This tooth receives excessive loading in its effort to rotate the delivery roller(s). This strain is still further increased by the action of a bronze collar brake sometimes applied to the roller at the extreme end to prevent over-running to ensure that the first tooth positions itself properly between two teeth of the driven wheel.

The intermittent front roller drive by means of a cut wheel is possible only on short spinning frames, i.e. those containing a limited number of spindles (Fig. 16). Safe working conditions in such case are ensured by reducing the front roller speed but this has an immediate effect on the production rate.

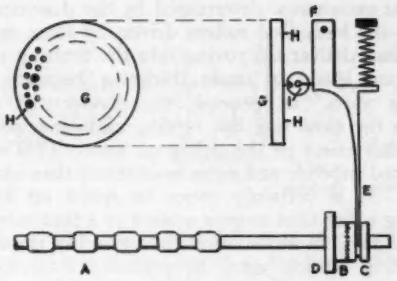


Fig. 17. A well-known type of random slubbing motion

The disadvantages mentioned have led later to the development of another type of intermittent drive, based on a clutch mechanism.

Fig. 17 illustrates a patent random slubbing motion designed by Tweedales and Smalley Ltd., Castleton, near Rochdale.[18] A is the front roller with a special clutch mechanism mounted at the end. Part B of the clutch is fixed to wheel D, the latter being free to rotate on the front roller. The other half C actuated by a fork E can slide on a sunk key on the front roller shaft. Fork E fulcrumed at F is operated by a suitably designed "slubbing" wheel G. This wheel has two concentric circles of holes drilled in

Fig. 18. Display card showing a slub yarn having uneven stems

it to receive a number of pegs H, and these operate the clutch at the desired intervals. A peg will actuate the fork lever through an anti-friction bowl I thus throwing part C out of gear to stop delivery of the front roller.

The arrangement of slubs is determined by the position of the pegs in the slubbing wheel. Random arrangement of the latter will produce corresponding slub effects in the yarn. However, as the size of the slubbing wheel is limited so is the period of the slub irregularity.

In order to break down the above repetition of slubs the anti-friction bowl has along its axis one or more grooves sufficiently deep to accommodate a peg (shown in the sketch) thus obviating a clutch displacement at irregular intervals.

Accelerated Roving Feeding

Another method to make slub yarns also involving manipulation of the roving is to speed up the delivery

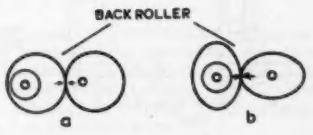


Fig. 19. Accelerating roving feed by eccentric gearing

rollers at an interval determined by the designer. In this method the back feed rollers driven by some appropriate mechanism deliver the roving into the drafting zone at an accelerated speed to cause thickness fluctuations in the resulting yarn. In general, the greater the difference between the slow and fast feeding and more pronounced is the slub effect in the delivered yarn. This method is considered superior and more satisfactory than intermittent feeding. It is certainly easier to speed up an already revolving roller than to give motion to a stationary one. It must be said, however, that the assembly imparting the accelerating motion must be precision built so that no delay occurs in taking up the drive, particularly when the back roller assumes the slow speed.

Theoretically, the back roller drive is designed to run at either slow or fast rate but, in practice, it has sometimes happened that on declutching of the back roller its speed is reduced beyond its required slow rate. The extent of this delay will depend on the depth of gear meshing and on the length of the gearing train. Sufficiently deep meshing will reduce the play in the teeth and consequently the backlash in the gearing may be practically eliminated. Roller backlash, due to incorrect meshing or an oversize gear wheel bore, can create a thin place in the stem shortly after each slub and this reduces the strength of the yarn appreciably (see Fig. 18).

Accelerating Slubbing Motions

Periodical irregularities in yarns due to eccentric drafting rollers, eccentric gear wheels and off-centre bores have long been known to the fancy yarn spinner, and when these eccentricities are accentuated they can produce very attractive slub yarns. One of the simplest ways of effecting an accelerated roving feeding is to drive the back rollers by a pair of eccentric or elliptic gear wheels (Fig. 19). The eccentric wheels can be placed one as a back roller driven wheel and the other as a draft change wheel (Fig. 20) (a). Obviously, this limits the draft range. It can, however, be overcome, by the addition of a swing on which are mounted a plain wheel and the driving eccentric wheel (Fig. 20) (b). The timing position of the eccentric gears is always clearly marked and correct setting of these marks should be checked prior to starting. The chief drawbacks of the eccentric or elliptic gear principle are: (*a*) limited flexibility and (*b*) regularly occurring acceleration.

Fig. 21 is an outline sketch of Platt Bros. slub attachment, a very efficient device capable of producing slub yarns with effects arranged at random.*[19] Two wheels B and C are positioned at the end of the front roller A. Wheel B through the compound wheels D and E, transmits rotary motion to wheel F attached to the freely rotating sleeve of the half clutch G. To accelerate the back roller speed, the portion G of the clutch must come into engagement with the second half H. The degree of acceleration depends on the speed of the portion G which can be altered by changing wheel E.

Clutching and declutching are both governed by the "slubbing" wheel K. This wheel has holes drilled at intervals and pegs or projections can be securely placed in the holes at the desired intervals. When a peg comes into contact with lever L, pivoted at N, the latter engages the portion G of the clutch with its counterpart H, thereby accelerating the already rotating back roller for a period depending on the speed of the slubbing wheel. This wheel is driven by the wheel C through the compound wheels I and J which are changeable.

Some means are also provided at the gear end of the spinning frame to allow for the over-running of the back roller. A glance at Fig. 22 shows that every rotation of wheel K gives a complete slub repeat on the yarn, the length of which can be altered according to requirements.

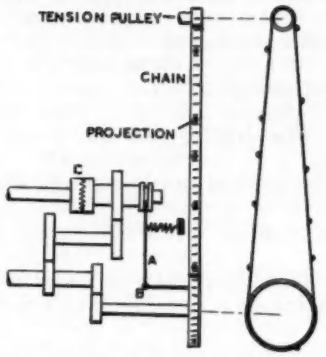


Fig. 23. Assembly details of "slubbing chain" method for producing a wide variety of slub effects and colours

With gearing, as in Fig. 21, the repeat length is:—

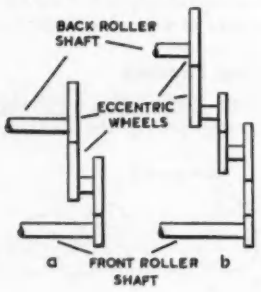
$$\frac{1 \text{ in.} \times \pi \times 45 \times 100}{20 \times 22} = 32\tfrac{1}{7} \text{ in.}$$

By placing four pegs, as in Fig. 22, the slubs occur as follows:—

Distance Between		*(Approx.)*
1st and 2nd slub	$= \frac{4 \times 32\frac{1}{7}}{20} =$	$6\frac{1}{2}$ in.
2nd and 3rd slub	$= \frac{5 \times 32\frac{1}{7}}{20} =$	8 in.
3rd and 4th slub	$= \frac{8 \times 32\frac{1}{7}}{20} =$	$12\frac{1}{2}$ in.
4th and 1st slub	$= \frac{3 \times 32\frac{1}{7}}{20} =$	5 in.

Longer repeats are possible by suitably changing the gear wheels in the slub attachment.

* *i.e. Random arrangement of slubs in short lengths of yarn.*



(left) Fig. 20. One arrangement for employing eccentric gears

(right) Fig. 21. Sketch of Platts' well-known slubbing motion

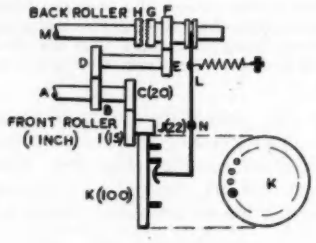


Fig. 22. Showing positioning of pegs in slubbing disc K

Fancy yarn manufacturers also have considerable scope by exploiting the possibilities of a "slubbing chain" in which the main assembly details are shown in Fig. 23. The chain studs are placed on the slubbing chain at desired intervals to operate the "L" shaped lever A pivoted at B. The height of the studs is such as to impart a suitable lateral movement on part C of the clutch, to engage the other half D fixed on the shaft of the back roller. The latter assumes an increased speed—other things being equal—for a period depending on the linear speed of the chain and the number of studs placed in successive links.

To allow the acceleration of the back roller a provision is made at the draft gear end of the frame. This device, sometimes called an escapement motion, is illustrated in Fig. 24.

Briefly, the driven back roller wheel is mounted on a separate shaft equipped with a ratchet wheel at the other end. The rotary motion to the back roller is transmitted by the ratchet wheel whose teeth are engaged by four spring-loaded pawls mounted on a plate fastened to the back roller. Should the latter accelerate the pawls slip, pass the ratchet teeth until declutching takes place when the revolving ratchet wheel engages with the pawls, thus transmitting the slow movement to the back rollers. The reason of utilising four pawls, each one being set approximately one-third of a tooth in advance of its predecessor, is to eliminate delay in the back roller when it resumes its slow speed.

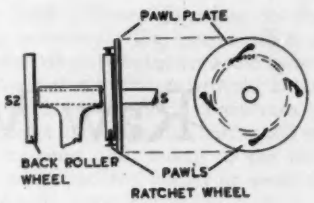


Fig. 24. Pawl and ratchet wheel escapement motion for accelerating back roller

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Suggestions for Sewing Foam-Laminated Nylon Fabrics*

ARRANGE each lay face up or face down, as preferred, but not foam against foam.

Avoid tension during laying-up. Fabric stretching may easily occur and result in loss of shape or size after cutting, when the applied tensions are removed.

No difficulty should be experienced in cutting foam-laminated nylon fabrics with standard equipment. Cutting edges must be kept clean and sharp; if any sticking or fabric fusing occurs, it can be remedied with a few drops of thread lubricant on two felt pads fitted to the cutter and in contact with the cutting edges of the knife.

Sewing

Using normal sewing conditions it is extremely difficult to sew foam-laminated fabrics because the foam drags on the feed plate and presser foot. Various ways of overcoming this drag have been found effective:

(1) By using a roller presser foot and a "Teflon"† covered throat plate, which have been found effective for foams up to $\frac{1}{8}$ in. thick. (On thicker foams the results have been variable.)
(2) By using a "Teflon" or "Fluon"‡ presser foot in conjunction with a rubber-covered feed dog. An ordinary feed dog will wear down the sole of the presser foot prematurely owing to the latter bearing down on the feed dog when there is no fabric between them.
(3) By running $\frac{1}{4}$-in. tape or binding between the top of foam and the underside of foot, sewing to the fabric in the normal way. Simple attachments fitted to the machine will hold and guide the tape so that the operator has both hands free for sewing. In addition to easing the sewing operation, this method gives stability to all seams and is particularly useful when inserting sleeves or facings.
(4) By sewing on a strip of paper (newsprint will do) between the top of foam and the underside of presser foot. The paper is easily removed after sewing.
(5) By the use of a needle-feed machine in which both needle and feed dog work in unison.

These fabrics can be sewn effectively with synthetic sewing threads, which are finer, more durable and stronger and shrink less in washing than cotton sewings. For general sewing, 130/3 Schappe-spun nylon or "Terylene"‡, or 75/3 textured "Terylene" can be used in needle and spool, near-equivalent counts being, of course, acceptable. Use a fine (No. 11) ball point needle as this helps to reduce needle heating. If heating persists apply a few drops of thread lubricant to a small piece of foam stuck on the presser foot and just touching the needle.

Use low thread tensions in needle and spool. High tensions may pull the sewing thread into the foam. Avoid high stitch ratings. About 10 stitches per inch have been found to be adequate for most of the fabrics tested.

If drag on the machine base or table top presents a problem, as when adding patch pockets, place a large sheet of paper between the machine base and the foam backing of the fabric in the area of the pocket. This will enable easier manipulation of the garment while the pocket is attached. Reduce pressure on the fabric by the presser foot until it is merely sufficient to give adequate feeding.

Very little pressing should be needed. Always press using the lowest position on a thermostatically controlled iron (and not exceeding 150°C.). If a steam press is used light mechanical pressure and low steam pressure are recommended.

* *Advance Report No. 44, issued by British Nylon Spinners Ltd.*

† *A trade mark of du Pont.*
‡ *Trade marks of I.C.I. Ltd.*

PRODUCTS AND SERVICES. A well planned booklet published by Stone-Platt Industries Ltd., Oceanic House, 1a Cockspur Street, London, S.W.1., is concerned wholly with the products and services of the group companies. The foreword states, "The formation of a large industrial group in this case from the merger in 1958 of two old-established engineering organisations, the Platt Bros. and J. Stone groups, present one inescapable requirement. That is to tell the world something about each of the companies in the group, their products and their achievements. This in itself poses quite a problem, one that is complicated in this case by the Stone-Platt policy of expansion and diversification, by the increasing variety of industrial interests served, and by the fact that those interests are spread all over the world amongst the business communities of some fifty countries."

In an extremely interesting manner, the booklet includes a history of the two groups and lists all the firms within the group, giving details—with some illustrations—of their manufacturing capacity, also details of head offices and factory areas. The alphabetical index is given in the English, French, Spanish and German languages.

* * *

SILICONES IN ENGINEERING. One of a series addressed to particular industries, this booklet from Midland Silicones Ltd., 68 Knightsbridge, London, S.W.1, shows how silicones are being used in many branches of engineering

Raw Materials of the Cordage Industry

Length of Staple, diameter and pliability, as well as the binding properties (determined by surface conditions) are the principal features in deciding the selection of fibres for thread and cordage manufacture

By S. A. G. CALDWELL, F.T.I.

THE raw material requirements of the cordage industry are as varied as are the uses to which its products are put. Extensibility; elasticity; resistance to weather and to effects of immersion in sea or fresh water for long periods; strength; and freedom from any tendency to kink when twisted into threads and cords are among the chief factors that, from a purely physical standpoint, determine the type of fibre to be used, though for reasons of economy substitutes approaching most nearly to the older established and more expensive cordage fibres in the required characteristics, are finding increasing favour with manufacturers.

The term "cordage" is generic and includes a wide range of manufactures from the finest parcelling twines to the heaviest cables. With it may be linked the extensive range of threads and lines of high quality, finish and fineness, which are used for sewing purposes by the textile boot and leather goods industries; being also largely employed for the manufacture of fishing lines, nets and similar requisites. Length of fibre staple, diameter and pliability, as well as binding properties which are defined by surface conditions, are guiding factors in the selection of fibres for thread and cordage manufacture, as they have a close bearing on the appearance and strength of the ultimate product.

In recent years silk, cotton, flax and true hemp, which formerly enjoyed a monopoly in the manufacture of threads and high class cordage, have met increasing competition from the growing number of man-made fibres in the manufacture of quality products. They are also being challenged by the coarser bast and leaf fibres, the spinning range of which is being gradually extended by improved methods of production and manufacture.

Two most notable man-made fibres which are finding increasing use in the thread and cordage industry are nylon and "Terylene." These possess many properties which make them especially suitable for the purpose, and extension of their use in this field is limited only by the cost in comparison with their natural fibre competitors. Strength, elasticity, dimensional stability, low moisture absorption, resistance to abrasion and to rotting are of fundamental importance in many major spheres of employment, and it is in the measure of these properties that most man-made fibres used in the thread and cordage industries are so much superior to their natural competitors.

Both filament and staple material are used, each form possessing its particular sphere of usefulness. Early attempts to replace sewing threads manufactured from natural fibres with those made from filament yarns ran into difficulties because of difference in performance on modern high speed sewing machines. These were eliminated by using spun yarns, but the process of stapling and processing the staple cancelled out many advantages inherent in the filament yarn. More recently modifications in filament yarn production techniques, and in the method of use, have greatly extended their application.

Nylon and "Terylene"

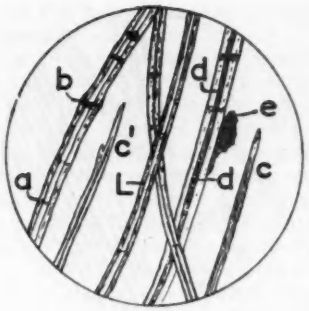
Nylon and "Terylene" are becoming increasingly competitive in the manufacture of marine cordage and other end products by reason of their low specific gravity, high tenacity, resistance to abrasion and to the action of salt water. The difference in cost between these raw materials and their natural fibre competitors, manila and sisal, is offset by their greater durability, and by the fact that lighter runnages are required because of the greater tenacity and resistance to wear. Both spun and filament yarns are used in the cordage industry, the latter type having the widest application.

In Table 1 specific gravity and tenacity values are given for natural- and man-made fibres commonly used in the cordage industry:—

Table 1

Fibre	Sp. gravity	Tensile strength Tons/sq. in.
Cotton	1·52	20·0
Flax	1·48	30·0
Manila	—	58·0
Sisal	—	36·0
Coir	1·14	25·0
Rayon (viscose)	1·52	12·0 - 20·0
Rayon (acetate)	1·33	8·0 - 10·0
Fortisan	1·5	55·0 - 60·0
Nylon (filament)	1·14	40·0 - 55·0
Nylon (staple)	1·14	30·0
"Terylene" (filament)	1·38	45·0 - 50·0
"Terylene" (staple)	1·38	30·0

Nylon is a synthetic fibre of the polyamide group. It is produced from coal and petroleum through their products hexamethylene diamine and adipic acid. The fibre strength is related to manufacturing conditions, which determine the degree of orientation of the component molecules by stretching the material in process. This also adds lustre to the resulting fibre. Two grades are commonly produced—standard and high tenacity. The standard filament has a tensile strength of 30 - 35 tons/sq. in. In the high tenacity filament it ranges from 40 - 60. The value for stapled filament is in the region 26 - 30.



True hemp

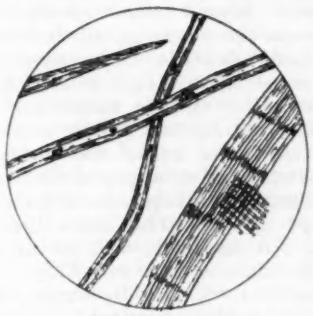
The elastic property is an important factor in cordage and ropes for many purposes. While this can be modified by the amount of twist inserted at the various stages of manufacture it is dependent primarily on the physical properties of the fibre used. Nylon possesses this property to a degree that makes it particularly suitable for use in end products requiring a high measure of elasticity. Standard filament has 100% recovery at 8% extension, and high tenacity filament full recovery at 4% extension. Its low specific gravity, resilience and resistance to abrasion ensure ease of handling and serviceability, the latter factor being enhanced by its resistance to the action of micro-organisms causing mildew and rotting.

"Terylene" is a synthetic fibre of the polyester group. It is manufactured from ethylene glycol and terephthalic acid, the latter also derived from petroleum. From the plastic stage onward the production process is approximately similar to that for nylon. Two types of filament—medium tenacity and high tenacity—are available to the manufacturer. The tensile strength of medium tenacity filament ranges from 35 to 45 tons/sq. in., and of the high tenacity grade from 45 to 55 tons. As in the case of nylon, when used in staple form its outstanding characteristics are largely discounted, the tensile strength being approximately half that of the high tenacity filament. Moisture absorbency is substantially less than in nylon, the regain being only 0·4% at 65% R.H. It is not attacked by insects or micro-organisms. The specific gravity of 1·38 is slightly higher than that of nylon.

Fortisan is a high tenacity rayon derived from cellulose acetate by saponification during stretching, which changes the chemical composition of the fibre to a form more nearly allied to viscose. The resultant filament is noted for its extremely high tensile strength, which exceeds nylon and "Terylene," being in the region of 55 to 60 tons/sq. in. It has a high resistance to stretch, with a good elastic recovery. At 1·5 the specific gravity is higher than for nylon and "Terylene." While possessing a good resistance to insect attack it is susceptible to mildew and rotting to the same extent as cotton.

Vegetable Fibres

Vegetable fibres are divided into three well defined groups, based on their position and function in the plant. The stem, or bast, fibres, which include flax, true hemp, jute, Indian hemp, ramie and several other lesser known fibrous materials, are located in the stem tissue between the bark and hard woody core, round which the composite fibre strands are linked together by branching to form a strong elastic network. These are frequently referred to as "soft" fibres by reason of their suppleness, and the ease by which the composite strands can be reduced to their component elements during preparing and spinning.



Manila hemp

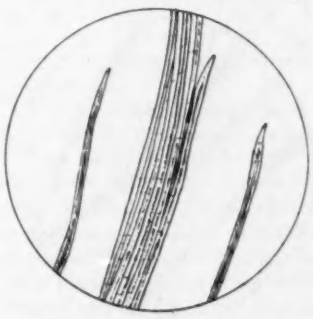
The so-called hard fibres which are used extensively in the manufacture of coarse cordage and ropes are representative of the second group which includes leaf fibres. These are also of a composite nature, the strands being located singly or in groups in the leaves of the parent plant. The fibre cellulose is intermixed with lignified compounds which impart to these fibres their characteristic hard feel, and prevent the degree of breakdown by ordinary methods of preparation and spinning to produce fine yarns.

The third group is represented by seed fibres, and includes only two members of commercial importance—cotton and coir, which are extreme examples of the soft and hard fibre groups. They possess no features in common beyond the fact that they are of vegetable origin and are associated with the plant seed. Here, however, they fulfil different functions in the plant economy. The cotton fibre is attached directly to the seed and assists in dispersal of the latter with the aid of the wind. Coir fibre constitutes a protective lining to the hard shell of the cocoanut and, owing to the size and weight of the kernel or seed, is necessarily hard and springy.

While the leaf fibre bearing plants constitute an extensive group whose natural habitat is mostly in tropical and sub-tropical countries, only a few members are cultivated extensively to date for their fibre, and of these sisal and manila constitute the bulk of supply. Increasing industrialisation in many countries, including development of domestic cordage manufacture, is extending the use of lesser known fibres as their specific requirements in extraction and manufacture are studied.

Manila hemp is obtained from the leaf stalks of Musa textilis, a variety of plantain indigenous to the Philippine islands. The plants attain a height of 10 to 20 ft., the main stem consisting of closely overlapped leaf stalks. Reproduction is usually by suckers, and the plants are ready for harvesting in 2 - 3 years' time. The leaf stalks are cut off close to the ground with a sharp knife, and the outside layer of the stalk which contains the fibre is peeled off in ribbons. These are scraped to free the fibre strands from their surrounding tissue, the process being usually performed by hand, making use of a knife which is hinged at one end and rests with its edge on a wooden cleaning block. The strips are drawn through between the knife edge and the block several times to effect complete removal of the extraneous matter. This method of decortication is slow, production being limited to about 50 lb. of scraped fibre per man per day. This is subsequently washed and dried in the sun, following which it is ready for grading and packing for shipment.

Fibre quality varies with the position of the stalk in the crown. Those on the



Sisal

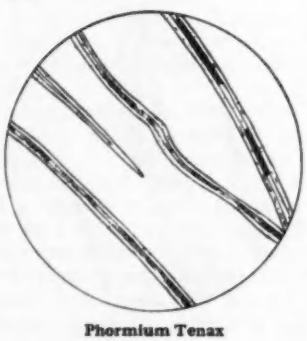
outside produce fibre coarser, of lower quality, and darker colour than that obtained from the inner stalks. Between the extremes a wide range of fibre qualities is obtainable. A rough classification of the material into three grades is made subsequent to scraping. Fibre extracted from the inner leaves is termed "Tupoz"; material from the middle leaves being designated "Lupis"; while that from the outer stalks is called "Bandula."

The composite fibre stands are straight and smooth, being practically round in cross section, and varying in length from 6 to 12 ft. The component fibres have overall dimensions of 8 to 12 mm., with diameters ranging from 20 to 30 microns. The individual cells are smooth on the surface, lustrous in appearance, while the central canal or lumen is larger than is the case with many similar fibres of vegetable origin. It is frequently found to contain a yellow coloured substance. Chemical tests indicate a high degree of lignification, being estimated as high as 30% by some investigators. The lignin content increases with the age of the leaves.

Sisal

Two factors favouring the increasing use of sisal in the cordage industry have been low production cost and the good colour of the product, which makes it suitable as a substitute for the higher priced manila. The fact that supplies of this fibre are readily obtainable from Commonwealth sources is a further advantage to British cordage manufacturers.

Sisal fibre is extracted from the fleshy sword-like leaves of some species of the Agave family, the most important being A. sisalana; A. fourcroydes; and A. cantula. The fibre obtained from A. sisalana is superior in appearance, strength and spinning quality to that extracted from A. fourcroydes, this difference being due in no small measure to improved methods of cultivation and a better system of fibre extraction.



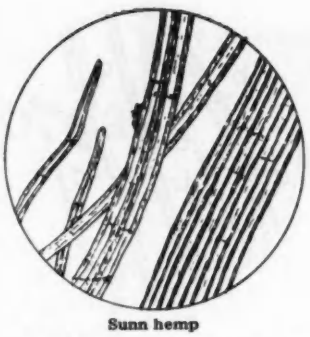
Phormium Tenax

Mexican sisal, or Henequen, is obtained from A. fourcroydes, which is indigenous to the country. It is cultivated extensively in the State of Yucatan for fibre purposes, and the product constitutes an important item of the country's export trade, with the U.S. as chief consumer. This variety of agave gained favour with growers in Mexico by reason of its adaptability to variations of climate, and its resistance to disease. Although the fibre is more brittle, lacking also the suppleness and spinning quality of that from some other members of the group, it is very resistant to weathering and to the deteriorating action of salt water. Fibre extracted from the younger leaves is used sometimes by the natives for the manufacture of coarse fabrics.

The product of A. cantula is known as maguey fibre. This plant also is indigenous to Mexico, where it is found growing extensively in bare rocky districts. Much of the Mexican maguey is obtained from plants growing in the wild state. A. cantula is cultivated in the Phillipine Islands for fibre purposes. Little labour is required beyond that necessary to prevent the young growth becoming choked with weeds. Dry rocky ground is best suited to its cultivation for fibre purposes, as with a richer soil the plants develop too rapidly and the leaves possess a low fibre content. Plantations are developed from suckers, and cutting may begin after about three years' growth. The leaves average over 5 ft. in length, with an approximate diameter of 3 in. They yield from 3 to 6% fibre by weight, this being usually extracted by hand scraping.

Only the outside leaves are removed from the growing sisal plants during the first cutting years. The number is gradually increased until all fully matured leaves are taken off at each cutting. Selection of those to be removed is determined rather by their position than by appearance, for as the leaves become fully developed they drop from the upright position in which they protect the growing crown, to one almost horizontal, in which they are considered ready for cutting. Leaves required four to five months to reach maturity.

The long fibre of commerce consists of individual fibre-vascular bundles which are isolated in the fleshy tissue of the leaf. The latter requires to be scraped away, the cleaned fibre being subsequently washed to remove extraneous matter and plant juices. The fibre bundles extend the full length of the leaf tapering considerably towards



Sunn hemp

the top end. Each one consists of a main strand semi-circular in cross-section and built up from thick walled cells. A secondary strand of smaller dimensions lies behind and separate from the main strand, forming with it an incomplete circle. The component cells of this secondary structure are usually larger in dimensions and thinner walled than those of the main strand. The ultimates in both the main and secondary strands are short in staple and vary considerably in size, ranging from 1·5 to 4 mm. in length, and 20 to 30 microns in diameter. They are more or less polygonal in cross-section and taper sharply at the ends. Fibre strength is closely associated with the strand and cell structure. Thick walled units built together to form a compact strand give fibres of maximum strength.

The harsh handle and inherent stiffness of sisal fibre is due to its considerable lignin content, which also increases with the age of the leaf and that of the plant itself. Fibre extracted from young leaves obtained from old plants has a higher lignin content than that obtained from leaves of the same age which have been cut from young plants. As the degree of lignification is closely associated with spinning quality the best class fibre is obtained from young plantations. East African sisal is more supple than henequen, being capable of producing cordage of superior appearance and higher breaking strength.

Coir

Coir fibre is obtained from the fruit of the cocoanut palm Cocus nucifera, of which several varieties exist. Only two of these— C. nucifera rutila and C. nucifera stupposa—are suitable for fibre production. The former yields the finest and most supple fibre, that obtained from the latter variety being coarse, harsh, and possessing poor spinning quality. Costal districts of India, Ceylon, the Dutch East Indies

and the Philippine Islands are the chief centres of production.

Coir fibre constitutes an internal covering between the outer husk and the hard shell protecting the kernel. The nuts are harvested, preferably in an unripe condition—the husk being broken to remove the kernel, after which the outer coverings to which the fibre adheres, are steeped. This may occupy several months, being effected in pits of sea water, to which the tide has direct access. The soil from which the pits are dug and the freedom of access for changing the retting liquid, have an important bearing on fibre colour and quality.

When the husks have been sufficiently softened by steeping they are removed from the water, being subsequently spread on rocks and beaten with wooden mallets to free the fibre from the adhering tissue, which can then be eliminated by shaking. The fibre is spread on the ground to dry, being subsequently threshed and willowed to remove any extraneous matter still adhering to the fibres, this operation also softening them and improving spinning quality. The harvested nuts yield about 5% of their weight of dry fibre.

The material is graded into three qualities for marketing. These, and the uses to which they are put, are stated as follows:—

Mat Fibre. Constitutes the finest and best material extracted. It is suitable for manufacture into ropes, coarse cordage and matting.

Bristle Fibre. A coarser fibre usually employed as filling for certain types of brushes and brooms.

Curled Fibre. Short coarse and springy material used in the upholstery trade.

The decorticated material consists of coarse, stiff and very elastic strands about 10 in. long. Each strand is built up from single cells which vary between 0·5 and 1·0 mm. in length, with diameters ranging from 12 to 24 microns. Each cell has a smooth surface penetrated by pores. The fibre walls are fairly thick with irregular identations marking the inner surface. The extent of lignification increases with the degree of ripeness when harvested.

Coir fibre is used extensively in the manufacture of cordage and matting. Its structural characteristics and properties differ to such an extent to those of other hard fibres as to preclude its use in admixture with any of these. Its great elasticity, strength, resistance to abrasion and to the deteriorating action of water make it particularly suitable for tow ropes, etc., which are claimed to give a length of service exceeding that obtainable with other hard fibres. Yarn exports from India alone exceed 50,000 tons annually.

Cotton and Flax

Cotton is used extensively in cordage manufacture, the range of cotton products extending from parcelling twine to heavy driving ropes for power transmission. Despite the relatively high cost of this fibre in the production of heavy cordage materials its use is justified by reason of the superior wearing qualities and other special characteristics which make it particularly suitable for the manufacture of power transmission ropes and banding.

In structure cotton is one of the least regular of the major textile fibres of vegetable origin. Individual fibres range in length from ½ in. to 2 in., with proportionate diameter fluctuations. They are usually more or less flattened, with an appreciable amount of twisting. These features have an important bearing on the method of manufacture and on the spheres of usefulness of the manufactured product.

Flax occupies an important place in the group of cordage fibres, its special sphere being in the manufacture of heavy threads, lines and light cordage, in which its strength, low elasticity and resistance to wear can be exploited to advantage for specific purposes. Flax belongs to the group of stem fibres which exist as composite bundles embedded in the bast tissue lying between the cortex and hard woody core of the stem.

The scutched flax, which constitutes the raw material of commerce consists of composite strands from 18 to 36 in. long. These are built up of individual cells about 1½ in., which taper gradually at the ends and overlap, being held together by plant gums similar in nature to those in which the strand is embedded. The fibres are polygonal in cross section, and when freed from their surrounding tissue they possess a smooth surface traversed at intervals by certain characteristic markings. Fibre quality is determined largely by time of pulling and proper control of the retting process.

Hemp and Jute

The term "hemp" is frequently used to designate one or other of a wide range of fibres which are obtained from an equally wide group of plants. The fibres these produce differ also in general appearance and in the uses to which they may be applied. True hemp is a bast fibre obtained from the plant Cannabis Sativa, which is indigenous to many countries and has been cultivated for fibre purposes throughout south-east Europe for centuries. It is similar in many respects to flax of medium and low quality with which it may be blended.

Owing to its lack of strength and rapid deterioration when exposed to moisture the use of jute in the cordage industry is confined to production of parcelling twines and cords for indoor use where strength is not an important factor. Jute is a bast fibre, being obtained from the stems of the plants Crotalaria capsularis and Crotalaria olitorius. India is the main source of supply the industry being located in Bengal, and particularly in that large area of the province which is flooded annually by the Ganges and Brahmaputra rivers.

The fibre appearance, strength, and spinning properties vary considerably with the district in which it is produced, so that the recognised qualities are designated by the name of the district in which the fibre has been grown. The leading marks include:—

Serajgunge. A high grade fibre of uniform light grey colour, the filaments being unequalled for fineness and strength.

Narianjgunge. A strong, long fibred jute of good spinning quality, colour varying between creamy white and a reddish tinge.

Tossa. Fibre fairly uniform in colour, strong, and possessing good spinning quality.

Daisee. Fibre long in staple, dark coloured and fairly strong.

Like flax and hemp, jute strands are composite bundles which are built up from a number of individual cells—the ultimate fibres—held together by plant gums. These ultimates average slightly less than ¼ in. in length. The chemical composition also differs considerably from that of flax or hemp, the latter being pecto-celluloses, while jute belongs to the group of ligno-celluloses, including in its composition 20% lignin.

Two other Indian fibres used to some extent in the cordage industry are Sunn hemp—a product of the annual plant Crotalaria juncea—and Ambari or Deccan hemp, obtained from an annual Hibiscus cannabinus, a member of the Mallow family. Both are bast fibres, the former resembling soft hemp, and the latter jute in general appearance.

Spot and Figured Fabric Construction

Some of the methods employed, and the particulars, to manufacture a range of attractive dress and furnishing cloths

By A. J. BENNETT

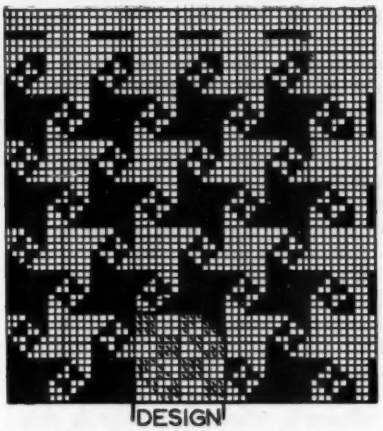


Fig. 1. Pleasant star effect produced by a six and six warping and wefting

A VARIETY of methods are employed in the effective construction of spot and figured fabrics for dress or furnishing purposes in natural or man-made fibres or blends of these. The simplest method of obtaining an all-over spot pattern is to take a simple weave, and then build up a suitable colouring order. In originating or discovering new spot designs of this type it is usual to make a range of various colouring orders in warp and weft on the loom, and then construct a series of designs to fit the repeat of the colouring order. Some very startling and really effective patterns can be evolved in this manner.

A very pleasant star effect produced by a six and six warping and wefting is shown in Fig. 1. The ground weave is based on the three and three hopsack in which certain threads and picks have been rearranged. The design is shown in the bottom centre of the figure starting from thread number 17 to 28, and on the first and second pick. This weave may be drafted down on to 10 shafts. Another simple method of producing spots is to adopt a plain weave ground and utilise the warp or weft to form flushes of either. Fig. 2 illustrates this method of producing a spot effect with weft floats of three and five in block fashion.

To give a regular all-over effect these block sections are based on the five-end satin with a lift of three, starting at the first spot. The design is complete on 40 ends and picks. This method of figuring is probably the simplest of all. Fig. 3 illustrates the method of obtaining spots or figures by the introduction of extra weft threads. In this case the spot is built-up on the ordinary 2/2 twill.

A distinct feature of these cloths in which extra materials are employed is that by taking away the extra threads from the cloth a complete plain ground structure remains. When the spot or figure weave is introduced on the ground weave by the warp it is usually necessary to cram the extra threads in the reed thus making the spot more compact.

In the design shown the spot is introduced in one and one order, but the figuring may also be introduced in the order of 1 and 2, 1 and 3, etc., according to the weave structure of the cloth. For looms with changing boxes on one side only it will be found necessary to insert the wefting 2 and 2, the order may also be arranged 2 and 4 although this may detract from the solidarity of the figure effects.

As will be observed in this design the figuring weft thread is conveniently stitched up to the ground weave in twill order and may be allowed to float freely on the back of the cloth. However, where the space between the spots or figure are excessive the weft is allowed to float along the back of the cloth and is afterwards cut away. This method is most suitable for light ground textures in which the stitching

Fig. 2. Producing a spot effect with weft floats of three and five in block manner

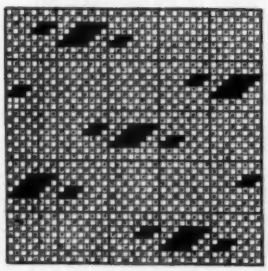
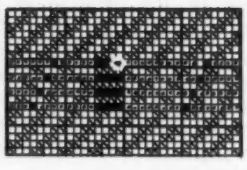


Fig. 3. A method of obtaining spots or figures by the introduction of extra weft threads.



This pattern illustrates spot and figured construction. A two-tone dress cloth, it has been woven in the white (this picture is 60% larger than the actual pattern)

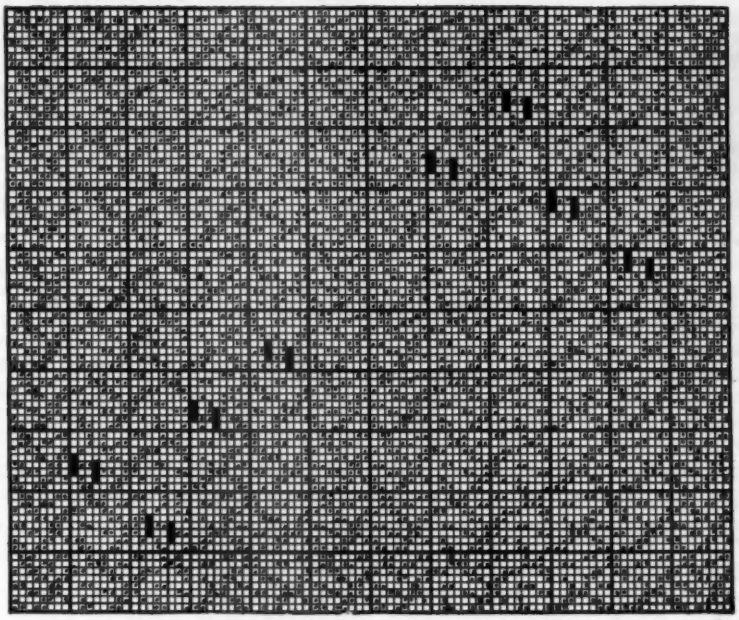


Fig 4. Spot effect in which the spot effect is introduced as extra warp

threads would be liable to affect the appearance of the face of the fabric.

Fig. 4 illustrates a spot effect in which the spot is introduced as extra warp. The ground weave complete on 8 ends and picks is designed to produce a basket effect as the ground feature. The spots are introduced in drop fashion and arranged to give a very pleasing all-over effect. Whereas the ground portion of the warp is reeded four in a reed, the section where the silk spot is developed is reeded six in a reed so that the spot may be more compact.

The warp floats are arranged so as to be well emphasised on the surface and not covered by warp floats alongside. The stitching up of the extra warp threads 1 in 8 are also arranged to be well hidden by warp floats on both sides. The design is complete on 96 ends and 80 picks and may be drafted down to weave an a dobby loom with 24 shafts; 8 shafts for the ground weave and 16 shafts for the figuring spots. By utilising pleasing contrasting warp and weft shades the basket weave ground effect will be emphasised.

Fig. 5 shows the construction of a section of a damask figured fabric and, although the true damask figured fabric comprises a weft satin figure formed on a warp satin ground or conversely, the term damask may also be applied to the type of structure reproduced here. This is generally known as a one-sided damask because the figure is obtained by a diversity of weave structure.

In this particular design the lighter section of the leaf structure is comprised of the eight-shaft satin weave with a move of three. The darker outside rim of the leaf structure is broken up solid in order to avoid excessive floats of warp. The floral section appearing in the bottom left hand corner is produced by weft floats. The general ground section of the design is carried out on the 3/1 twill.

These fabrics which are usually woven in full jacquard harness are usually made to supply the market for cotton and linen damasks in the white state for table napery. This type of design is also largely employed in silk and man-made yarns for a variety of furnishings and hangings. Sometimes the cotton or linen warps are woven with worsted or union weft and afterwards dyed and used for table coverings, hangings, furnishings etc. The last named method is also largely utilised for silk and worsted dress fabric, bathing and dressing gowns. The pattern shown illustrates one of these silk and worsted damask dress fabrics woven in the white with worsted warp and silk weft and afterwards dyed to produce the two shades.

In designing these damask fabrics it is usual to paint out the figures to be produced first on point paper, then run in the sections of the ground weave and supply the card cutting particulars for weaving. Where border fabrics are required special jacquard tie-ups are utilised for economy in the production of very large designs.

Knitting Exhibition

Fr. Mettler's Sons Ltd., Switzerland, on **Stand Nos. 4111 and 4210,** exhibit a hank to can winder for winding knitting yarns from hank into cans without draft or tension. Yarn speed control from 250 - 550 yds./min. The Cone winder RECO (Crowther/Mettler) also on view is for cone, cheese assembly and dye packages With grooved drum traverse for yarns on to cheeses or cones 3° 30¹ to 9° 57¹ taper of wood or hardpaper.

Fig. 5. A section of damask figured fabric. The lighter section of the leaf structure is comprised of the 8-shaft satin weave with a move of three

Positive Outside Treading for Multi-Coloured Weft Patterning

A POSITIVE outside cam treading motion has now been added to the range of shedding motions which can be applied to the "Standard Model" woollen and worsted loom made by George Hattersley and Sons Ltd., Keighley. Intended primarily for the manufacturer of blankets, tartans, tweeds, and similar cloths, where the designer obtains his effects more from the use of multi-colour wefts than from variations in weave, confining these to plains, simple twills, hopsacks and other weaves which repeat in eight picks or less. The additional complication of a dobby is therefore avoided and less power is consumed by the shedding motion.

Following the principle of the Woodcroft tappet, this new development embodies many refinements. Pointing out that it is more flexible than the old alternative cross-rod treading, in timing and capacity, and is simpler, having no springs, the makers emphasise that clean cloth is assured, as all the mechanism is placed outside the loom frame, with connections below the warp line.

Positive connection between the accurately machined positive cams through rigid snap-on connectors, also ensures that a smooth movement is imparted to the heald frames and this minimises warp breakages, and virtually eliminates warp stitching. Shed crossing may be staggered, and this is easy to effect, each cam being notched on the rim at each lift. A levelling lever is incorporated. Adjustments for height and level of shed are simple, and once made need no further attention.

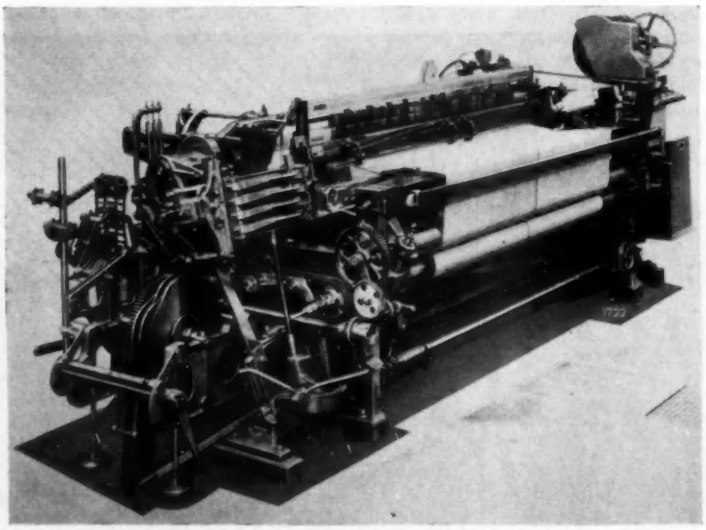
Changes of design are readily made, the cam shaft and cams are lifted out after removing two bolts. Two groups of cams may be mounted on this shaft and be run at different ratios, thus producing two weaves simultaneously. The capacity of this motion is up to 12 cams, in one or two groups, with ratios from four to eight to one. The cams are 17¼ in. dia., 120 mm. bore, 18 mm. ($\frac{23}{32}$ in.) pitch, and give 80$\frac{3}{4}$mm. lift for one-third of a pick dwell.

The drive is from the lowshaft through bevel gears to a layshaft which runs at crankshaft speed. The various ratios are obtained by mounting suitable sets of gears on the cam and lay shafts; the number of teeth on each are shown in the table below. Automatic or hand pickfinding is catered for by a clutch which reverses the cams when necessary, and keeps the healds in synchronisation with the loom.

The following ratios are available as standard, but other cams can be supplied to meet users' special requirements:—

Cam No.	U	D	U	D	U	D
4-TREAD (100T/25T)						
421.4.5	1	1	1	1	—	—
421.4.6	2	2	—	—	—	—
421.4.7	1	3	—	—	—	—
421.4.8	3	1	—	—	—	—
5-TREAD (105T/21T)						
421.5.5	1	4	—	—	—	—
421.5.6	4	1	—	—	—	—
421.5.7	3	2	—	—	—	—
421.5.8	2	3	—	—	—	—
6-TREAD (108T/18T)						
421.6.11	1	2	1	2	—	—
421.6.12	2	1	2	1	—	—
421.6.13	1	1	1	1	1	1
421.6.14	1	5	—	—	—	—
421.6.15	5	1	—	—	—	—
421.6.16	3	3	—	—	—	—
421.6.17	2	4	—	—	—	—
421.6.18	4	2	—	—	—	—
421.6.19	2	2	1	1	—	—
421.6.20	2	1	1	2	—	—

Cam No.	U	D	U	D	U	D	U	D
7-TREAD (112T/16T)								
421.7.3	3	1	1	2	—	—	—	—
421.7.4	5	2	—	—	—	—	—	—
8-TREAD (112T/14T)								
421.8.19	5	1	1	1	—	—	—	—
421.8.20	3	1	1	3	—	—	—	—
421.8.21	3	3	1	1	—	—	—	—
421.8.22	2	2	1	1	1	1	—	—
421.8.23	2	1	1	1	1	2	—	—
421.8.24	1	7	—	—	—	—	—	—
421.8.25	7	1	—	—	—	—	—	—
421.8.26	1	1	1	5	—	—	—	—
421.8.27	4	4	—	—	—	—	—	—
421.8.28	3	1	3	1	—	—	—	—
421.8.29	1	3	1	3	—	—	—	—
421.8.30	6	2	—	—	—	—	—	—
421.8.31	2	1	2	3	—	—	—	—
421.8.32	1	1	1	1	1	1	1	1
421.8.33	2	2	2	2	—	—	—	—
421.8.34	1	1	3	3	—	—	—	—
421.8.35	1	2	3	2	—	—	—	—
421.8.36	2	1	1	2	1	1	—	—



The Hattersley "Standard Model" fitted with positive outside cam treading for multi-colour weft patterning

Israel Cotton Production

The area under cotton in Israel is reported from Jerusalem by Barclays Bank D.C.O. to be increased from last year's 25,000 acres to 40,000 acres, yielding 16,000 tons of fibres, half of which is intended for export. According to a report compiled by the International Cotton Advisory Committee, the average cotton yield in the 1960-61 season was 928 lb. of fibre per acre—this represents the highest ratio of all the 44 cotton-growing countries listed in the report.

* * *

Southern Rhodesia Cotton Output

Production of cotton in Southern Rhodesia may be reduced by nearly half reports Barclays Bank D.C.O. This follows the expected discontinuation of commercial cotton growing by the Sabi Taganda Estate Co. (Pvt.) Ltd., in the Sabi Valley because of financial losses and a sharp drop in the producer price of seed cotton. About 1 million lb. of seed cotton have been produced from the estates this season.

TEXTILE MACHINERY and MILL EQUIPMENT NEWS

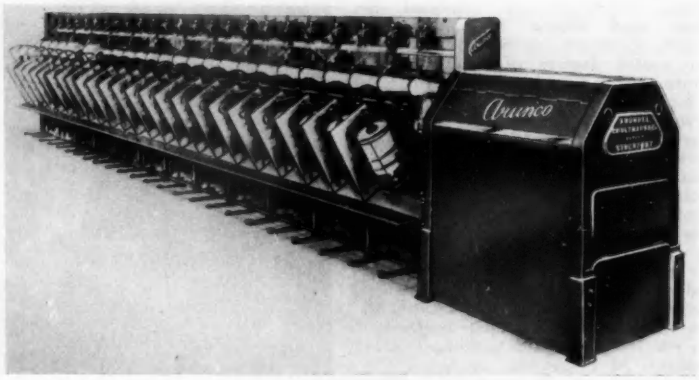
The International Knitting Machinery Exhibition

The present exhibition at Belle Vue, Manchester, October 11 - 25 *sets a new record for events in this specialised field. A brief review of some of the important machines, accessories and other equipment is given on this and the following pages*

The "Arunconer" high speed cone winder shown by **Arundel, Coulthard and Co., Ltd.,** on **Stand No. 3102,** has many features and is designed for winding yarn on to conical spools of 6, 8 or 10 in. traverse up to 10 in. dia. base at high speed, producing a perfect increased taper knitting package. It has independent drive to each side, whilst a simple arrangement for varying the speed of the drums and cams enables the drum to cam ratio to be changed to suit different classes of yarns. The machine can be arranged to wind soft cheeses and cones and is said to produce the perfect package for pressure dyeing.

The "Arunco" high speed cone winder

The new "Arunco" "Two-for-One" heavy twister, is designed specially for the coarse yarn trade and produces folded yarns into twisted yarns at high speed from cheeses on to cheeses or cones "S" or "Z" twist. This extremely robust machine —an interesting feature is the low type frame which contributes to reducing working fatigue for the operative, particularly in relation to the spindle which has a simple threading operation *from the top*— is fitted with tape driven clutch-type special heavy duty spindles which will handle a range of between 0·33's to 4's resultant counts. The spindle unit is particularly efficient on the heaviest counts and of special interest is a tensioning device to control the delivery of the yarn to the spindle to ensure greater uniformity of twist. The take-up portion of the frame is based on the "Arunco" winder—proved excellent in its particular field over many years—and embodies the special differential motion; improved traverse; ball and roller bearings throughout and precision ground shafts. A stop motion device controls both the take-up cheese and spindle on failure of yarn and positively driven feed wheels assist in providing more constant turns per inch. By the use of swivelling cradles, both cheese and cone packages may be processed.



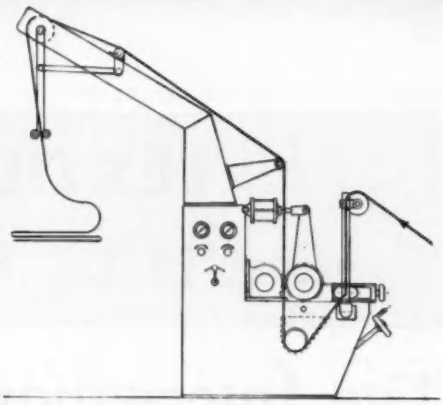
The "Arunco" "Two-for-One" twister

Also being exhibited is the latest development of the two-for-one twister (medium type frame) which deals with finer counts of yarn. This frame is 9¾ in. gauge and will twist from packages of 6 in. traverse by 6 in. dia. on to 6 in. traverse cheeses or cones at speeds up to 8,000 r.p.m. i.e., 16,000 twisting revolutions.

* * *

Their latest 36 in. JB (60) hydro extractor, specially developed to give high output, exceptional reliability and automatic control of moisture content is exhibited by **Thomas Broadbent and Co. Ltd.,** Huddersfield, on **Stand No. 1002.** A Broadbent motor specially designed and constructed for extraction duties is direct coupled to the basket, and the complete motor and basket unit is

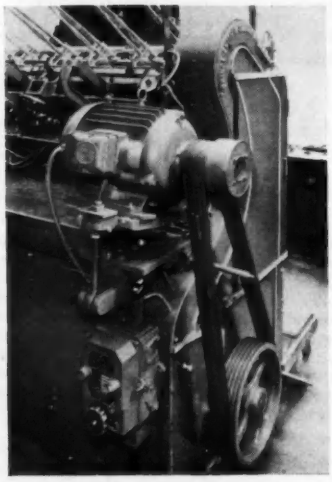
(left)
The New Broadbent 36 in. JB(60) 100 lb. extractor finished in corrosion resisting polythene and stainless steel



(right)
2-bowl pneumatic padding mangle for circular knitted fabrics

suspended in a patented system which reduces vibration to a minimum when out-of-balance loads are incurred, and eliminates the necessity for special foundations. Baskets are available in galvanised mild steel, stainless steel, or vulcanised.

The display of centrifugal clutches has particular significance to the textile industry, as the clutch enables textile drives to commence transmission under "no load" conditions and in the case of roving and winding machinery and exceptionally smooth start is assured, further-



Broadbent automatic centrifugal clutch on a Prince-Smith and Stells roving frame.

more starting current consumption is reduced.

Photographs of the KA Type Hydraxtor are shown. It is a pressure extractor employing an inflated rubber diaphragm to squeeze out the excess liquid against a perforated plate, using pressurised water to inflate the diaphragm. A great advantage of pressure extraction is the elimination of revolving parts; the water which is used under pressure is returned after use to a reservoir tank forming the base of the machine, and all that is necessary is an electrical supply and a drain for the surplus liquid.

The Vario-Cover, Type K.M. is displayed by **Schweiter Engineering Works** Horgen, Switzerland, on **Stand No. 2102** Designed for handling all types of staple fibres and for stabilised stretch yarn, the four demonstration units exhibited are equipped with various supply systems to unroll from muffs and hanks of different sizes, or to wind over-end from spinning bobbins and cakes, the latter by means of rotating plates. According to the material used the Vario-Coner may be equipped with the dry waxing device and/or moistening device. The cones produced are built-up on paper and plastic tubes of various conicities (3°30′, 4°20′, 5°57′, 9°15′) the final conicity being increased, if desired, to approx. 16° in the case of a 9°15′ cone.

On the Type KEK-PN precision coner, for synthetics, rayon, silk and high elasticity stretch yarn, the cones produced are of the pineapple type or, if desired, with straight edges, the conicity of the tubes in both cases being 3°30′ or 3°51′. Special features are the precision winding by means of the well-known Penta gear, the possibility of a constant or slightly increasing yarn speed, the tension reduction, the traverse variation and various auxiliary attachments, such as yarn delivery and moistening devices etc. (The British agents are A. E. Aspinall Ltd., Manchester).

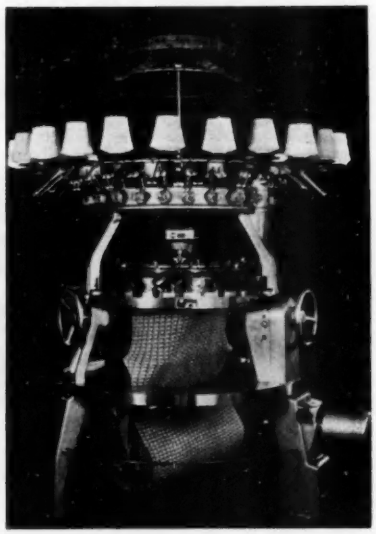
* * *

A number of their modern circular knitting machines are exhibited by **Alber and Bitzer K.G.**, Tailfinge, Wuertt., Germany, on **Stand No. 3508.** One special feature of the Albiquard Romrs machine, a jacquard circular, is its film controlled pattern switch wheels. By means of the system it is possible to create 2 colour circular bands in unlimited width. As it is not necessary to have additional yarn change equipment the machine is able to operate at a uniform speed, thereby achieving high production. This machine is of particular interest for the production of modern outerwear. It also has advantageous possibilities in the production of material for swimwear. Other machines on view include the ALBI interlock multifeeder circular machine, a fine rib 16 in. circular machine and a Combirib 30 in. circular machine. The sole agents are Bertrand W. Smith Ltd., 103 Highcross Street, Leicester.

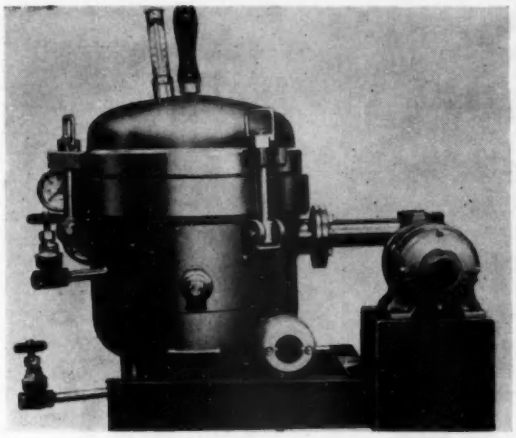
Sir James Farmer Norton and Co., Ltd., Salford, on **Stand No. 4102** are showing a dye padding mangle of a new design for use with circular woven fabric. The machine, initially designed for the padding of Procion dyestuffs, is fitted with two soft horizontally opposed rubber bowls, geared together to prevent slip. Additional features are circular openers, edge guiding rollers, small capacity stainless steel trough with a long cloth run, large diameter guide rollers to reduce the fabric tension. The use of horizontal nip is claimed to reduce the length of cloth between the trough and the nip, and therefore the length of unsupported fabric. This and various other features ensure that the fabric is subjected to minimum tension and equal treatment on both sides. The machine is capable of processing several pieces side by side simultaneously. The company will also be showing a new type of precision coating machine which can be used for applying P.V.C. and other coatings to knitted fabric.

* * *

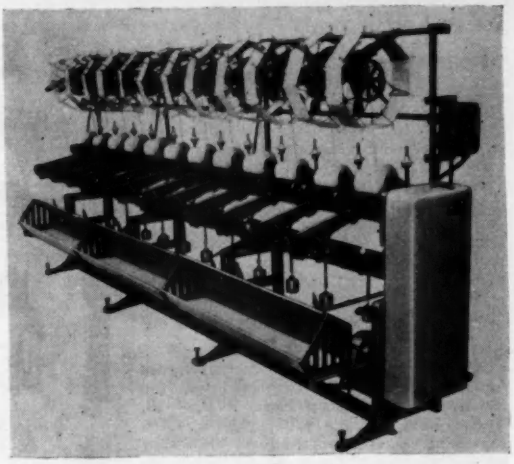
Carls Zangs A.G., Germany, show a 6 and an 8-head automatic embroidery machine, operated from jacquard card. This machine is widely used for motifs on sports shirts, children's garments etc. (The agents are Geoffrey E. Macpherson, Ltd., Nottingham). **(Stand No. 3103).**



Albiquard 30 in. jacquard circular machine



One of the speciality dyeing machines manufactured by Longclose Engineering Co.



Gilbos Type UC hank to cone and cheese winder

A new development in the range of double stick hank dyeing machines is exhibited on **Stand No. 2104** by **Longclose Engineering Co. Ltd.,** Leeds 11. The Mark V Model has a nominal batch capacity of 250 lb. whilst to complete this new range machines are available having capacities of 125 lb. and 500 lb. These machines are particularly suitable for natural and synthetic hosiery and hand knitting yarns; a streamlined flow is obtained by the specially designed propeller chambers. A rigidly constructed double stick frame has (*a*) use of triangular dyesticks which eliminate resist and glaze marks, and (*b*) The sticks are arranged at staggered intervals, the bottom set being adjustable between wide limits. Provision can be made for the coupling of pairs of the 500 lb. and 250 lb. units to enable larger weights to be dyed.

The other main exhibit is a high temperature horizontal beam dyeing machine suitable for both warp knitted and woven fabrics in natural and synthetic fibres. The machine is designed for operation at temperatures up to 130°C. and above. Incorporated is a quick acting pressure cover on the horizontal dyeing chamber, executed throughout in stainless steel and including a non-pressurised synthetic sealing element. The machine is complete with liquor addition and sample matching units, a reversing device for two way liquor flow circulation and a closed coil heat exchanger system. A liquor preparation/reserve tank is normally supplied with this machine.

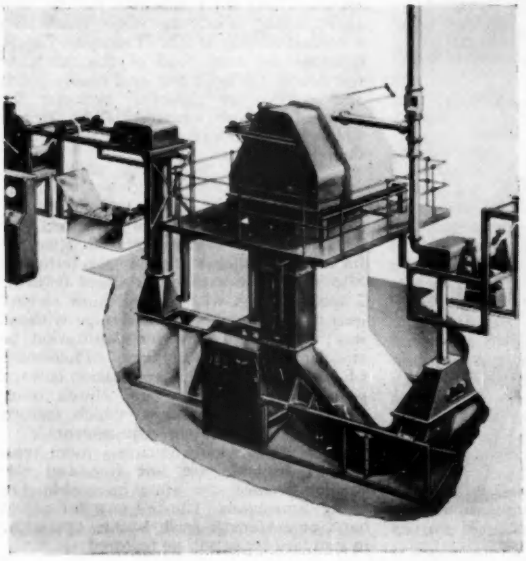
The whole machine is constructed in stainless steel including all valves and fittings. Also on display are examples of the type of beam used with this machine. In addition, laboratory equipment including the pilot high temperature pressure dyeing machine is displayed. The Longclose 8 beaker high temperature sample dyeing unit on view enables rapid evaluation of new recipes, dyestuffs, chemicals etc., on small weights of 5 - 10 gms of material at practical liquor ratios.

* * *

A scale model of a new design of continuous bleaching range is exhibited by **Mather and Platt Ltd.,** on **Stand No. 5107,** various precision components of other machines, and samples of fabric treated on them, supported by a photographic display of machinery from the wide range of textile finishing equipment manufactured by the firm. This continuous bleaching line, now under manufacture will it is stated, economise in labour, chemicals and steam, using either sodium chlorite or hydrogen peroxide and suitable for many fabrics.

At the entry to the range is a slack-rope scouring unit followed by a slack washer unit with controlled outgoing squeeze. After those processes the rope is sprayed inside the entry tube of the saturator with sodium chlorite solution drawn from the saturator, in which an intimate mixing of the appropriate chemicals is carried out. Optimum pH conditions and concentrations are regularly reproduced, and recorded. After soaking fully relaxed, the fabric passes through a nip to reduce and control sodium chlorite content. It then proceeds through a heat-controlled tube and on to the piler mechanism at the top of the J-box. The J-box is lined with non-corrodible titanium and stores 2250 lb. of fabric for reaction at 98 - 100C. Even piling is achieved by an all-titanium mechanism with plastic oil-less bearings, and pile height is electronically controlled. Adequate heating of the fabric is provided by a saturated steam distributor at fabric level. Before the fabric leaves the J-box unit it passes through a spray-wash chamber and a controlled squeeze nip. Finally, the fabric is washed under relaxed conditions with a controlled outgoing squeeze.

* * *



Overall view of the Mather and Platt continuous bleaching range in which the J-box is lined with non-corrodible titanium and stores 2250 lb. of fabric

Gilbos s.p.r.l., Ateliers de Construction, Belgium, show on **Stand 2007** their Type U.C. hank and cone and cheese winder for all types of knitting and weaving yarns at high speed with minimum number of knots, including Orlon, crimped nylon and other textured yarns, boucle, sewing threads, carpet yarns, coarse hand knitting yarns, etc., hence its ever growing popularity. The model is designed for winding 9°15′ and 5°57′ cones, 6 in. traverse, but it is also available for winding cheeses and cones up to 4°30′ with 5 in or 6 in. traverse. It is equipped with very sensitive disentanglement stop motion and yarn delivery device. the winder ensures optimum production and knitting efficiency with minimum knots. Other features include power-driven, friction-driven, or liquid waxing unit, strong metal swifts, etc.

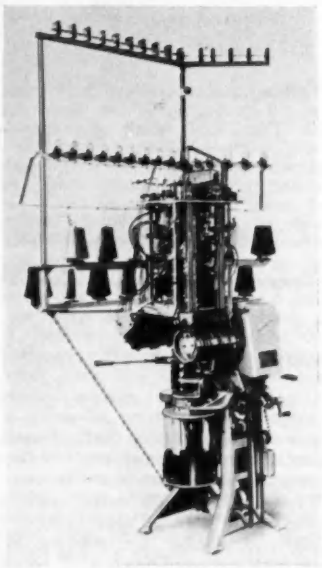
Type R.C.N. high speed cone and cheese winder is for all spun yarns of any count and quality for winding 9°15′ cones with increased taper, 5°57′ cones or cheeses and cones up to 4°30′, with 5 in. or 6 in. traverse, at speeds up to 1100yd./min

It is equipped with special grooved drums resistant to wear, an anti-ribboning device, 4 self-threading tension unit, cop-holders adjustable in height, speed variator and tachometer on each side, conveyor belt for empty cops, this machine can be supplied with power-driven or friction-driven waxers, conditioning unit and slubcatchers, according to requirements. (Sole agent in the U.K. and Eire is Robert S. Maynard (Wilmslow) Ltd., New Rex Buildings, Wilmslow).

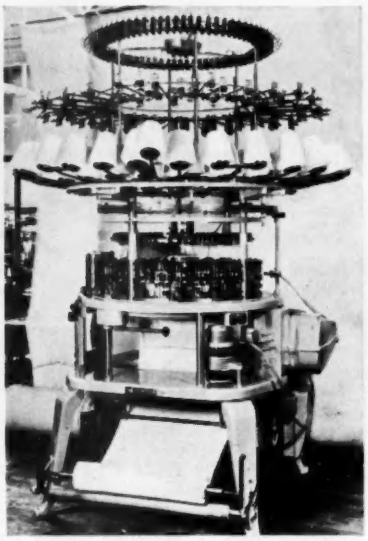
* * *

The fifteen double cylinder machines for ribknit footwear displayed on the **Bentley Group Stand Nos. 4009, 4010, 4107, 4108, 4206, 4207, 4306, 4309.** represent a cross-section of the very extensive range of types, sizes and gauges available, and include an entirely new development in multifeed production of fancy patterned half-hose. Several standard Bentley attachments are incorporated to indicate the increased scope and versatility which they can provide. Models demonstrated range from a 2½ in. dia. super fine gauge BR machine for kiddies socks to the latest three-feed models for jacquard half-hose, various gauges of terry footwear machines and a coarse gauge ML machine for knee-high and sports socks with large links-links patterning. Also included are a very fine gauge JL for two-feed jacquard in leg and foot, two medium gauge links-links half-hose machines, a medium and extra fine gauge CP for combined jacquard links-links patterning, a fine gauge JT for jacquard patterning in either turn-over or straight tops of children's socks and a double feed model for Jacquard float and wrap thread patterning..

The Bentley steady dial looper, built in various models and gauges from 4 to 44 points per inch, is demonstrated by three machines, namely a fine-gauge Model F for linking nylon stockings, a coarse gauge machine for half-hose, and the latest Model OC which links necks as well as parts of full-fashioned or cut garments.



Bentley TJ. 3-feed machine for jacquard footwear



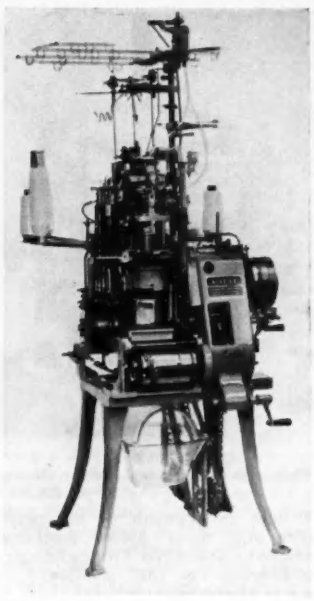
Bentley ISL machine for interlock garment lengths

The well-known KL seam-free hose machines are represented in their redesigned form by both single and double feed models (3¾ in. × 400).

* * *

To interest the outerwear manufacturer **Kemptener Maschinenfabrik G.m.b.H.** exhibit on **Stand No. 2312** their well-known large dial circular linking machine K.M.F. Class 105 in two different constructions, the normal Class 105I with needle working from inside to outside and the Class 105A with needle working from outside to inside; both systems are interchangeable on the one machine. On the Class 105A is a special attachment to overcome the problem of needle breakage. Other features are (*a*) infinitely variable speed drive, (*b*) complete rotation of the needle crown in either direction and (*c*) the new adjustable tubular steel stand which gives a more comfortable working position for the operator. The gauge of the machine can be altered in only 30 min. by the substitution of interchangeable point rings. Work trays,

The K.M.F. Class 105



Bentley KL seam-free hose machine

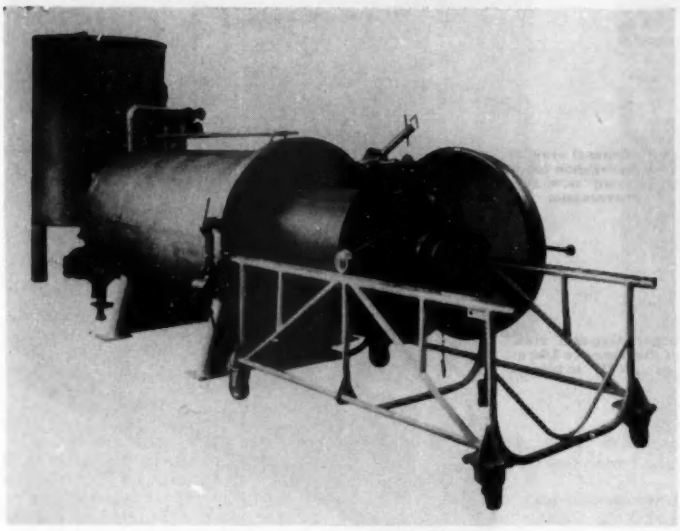
Kemptener KMF Class 104

special machine lights and adjustable chairs are also available for the Class 105 machine. Also on show is the Class 104 regular chain stitch machine for the high speed joining of selvedge edged goods with a normal linking stitch. Transport bands, maintain an even feed of the fabric to the needle for both fine and coarse goods and continuous chaining between the garments is also ensured. (The British agents are Kilbourn Martin Ltd., Sanvey Gate, Leicester).

* * *

Brook Motors Ltd., Huddersfield, make an important feature on **Stand No. 3311** of motors manufactured specially for certain branches of the textile industry. Slip ring motors used for speed control; 2 speed motors with custom built control gear to give smooth speed change without jerk; both items are for application to circular knitting machines. There are f.h.p. motors for special application on yarn preparation machinery and clutch units for making up machines, which feature motors to clients' own requirements.

A range of totally enclosed loom type motors available are lint free and the smaller frames are interchangeable for fixing dimensions. Control gear for either hand or automatic push button operation in standard types will be featured.



The "React-O-Mat" horizontal beam dyeing machine with control panel for pumps and automatic temperature controller

Uster evenness testing equipment

Freeman, Taylor Machines Ltd., Syston, Leicester, show their horizontal "React-O-Mat" beam dyeing machine for dyeing all classes of woven and knitted fabrics made from wool and synthetic fibres, on **Stand No. 4103.** Designed to operate at temperatures up to 285°F., it is built in a range of sizes to take varying widths of materials up to a maximum of 138 in. Reversible liquor circulation is by a pumping arrangement internally situated in the end of the vessel. This arrangement gives, it is stated, an extremely efficient liquor circulation, more evenly distributed temperature rises in the liquor, and reduced liquor-to-goods ratio. The static pressure required for dyeing at high temperature is developed by an external pump attached to a dissolving pan, this pump is also used for injecting dyestuffs into the main vessel when required. Visitors can also examine the vertical "React-O-Mat" package dyeing machine. The liquor flow principle on this machine is similar to the beam dyer, but in this case the vessel is vertical and the motor driven circulating pump is located in the base of the vessel. The machine is built in a range of capacities from 50 lb. to 1,000 lb.

The F.T.M. "Plusflo" hank dyeing machine on view is for dyeing wool, cotton and synthetic fibres in hank form, the liquor circulation being by propellers over four sided weirs to ensure that a considerable volume of dye liquor is circulated evenly throughout the material at low velocity. The firm's "Gridflow" side paddle dyeing machine for dyeing garments, hosiery, half-hose and fabrics and a development of this machine is the "Extenflow", having a special paddle with extendable blades, designed to give greater flexibility of machine loadings.

The "Plusflo—Cotanga"—(a modified "Plusflo") is also displayed.

* * *

The "Uster" evenness tester is one of several specialities displayed by **Zellweger Ltd.,** on **Stand No. 3408.** This apparatus is used for testing the regularity of slivers, rovings and yarns. The cross-sectional trace of the material tested is given in the form of a diagram. Measured values of % mean deviation or % co-efficient of variation can be compared with the "Uster Standards." The company's fully automatic integrator also on view, permits the direct indication of the average irregularity percentage of slivers, rovings and yarns. The evaluation is done, fully automatically, at the same time as the registration of the trace of the diagram.

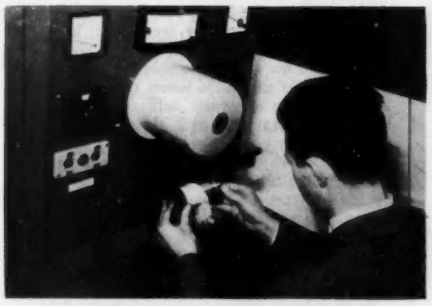
The Uster spectomatic yarn fault control installation

An additional apparatus to the evenness tester, the automatic spectrograph, serves to analyse the irregularity of slivers, rovings and yarns. The automatically recorded spectrogram permits the source of faults in the spinning machines to be located quickly and accurately.

An imperfection indicator shown determines the number of neps, as well as the number of extremely thick and thin places in a certain length of yarn. The automatic yarn strength tester on view tests, automatically, the breaking strength and elongation of yarns, whereby the measured results are recorded individually in the form of a diagram and, furthermore, as a total value of the individual tests. Visitors will also see the spectomatic yarn fault control installation and the Uster thread tension gauge. (The British agents are G. W. Thornton and Sons Ltd., 10 Eden Place, Cheadle, Ches.).

* * *

M. Scaglia, Milan, Italy, have introduced a new type of bobbin stripping machine, suitable only for bobbins with metal barrels. Shown on **Stand No. 3511,** it strips yarn by means of a blast of hot air. The machine operates at a variety of temperatures—from 400 to 450°C for acetate and nylon, to 800°C for viscose rayon. Operation of the machine is extremely simple, the operative merely passes the barrel of the bobbin below a small nozzle which directs a jet of hot air on to the yarn to be removed. The cut is quite clean, the waste yarn falls away into a waste collector and it is stated, it is possible to strip up to 850 bobbins per hour.

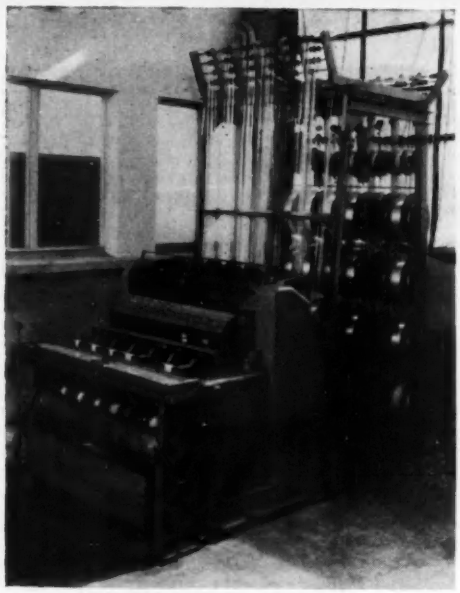


This new type of stripper removes yarn from metal bobbins by a jet of hot air

The agents in the British Isles are Barke Machinery Ltd., 100 Portland Street, Ashton-under-Lyne.

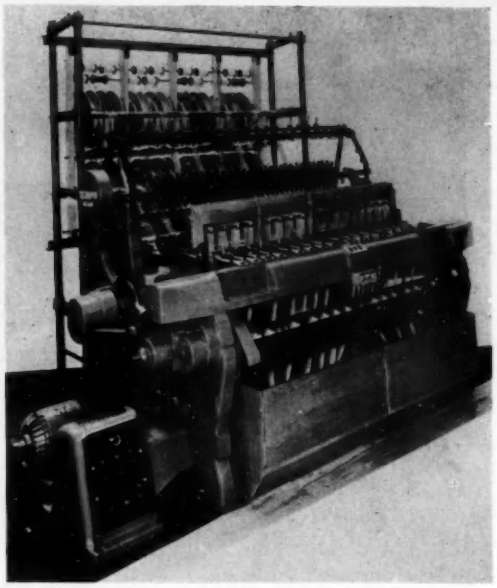
* * *

Liebers and Co. Stand No. 2309, display a wide range of sinkers and companion elements for all types of knitting machines, including seamless and fashioned hose and double-cylinder, together with guide needles for warp and raschel looms. (Kilbourn Martin Ltd., are the sole agents for Great Britain and Eire).



(left) General view of a Muller ribbon loom with many new improvements

(right) General view of the Texnovo Ultratex 16/25 machine



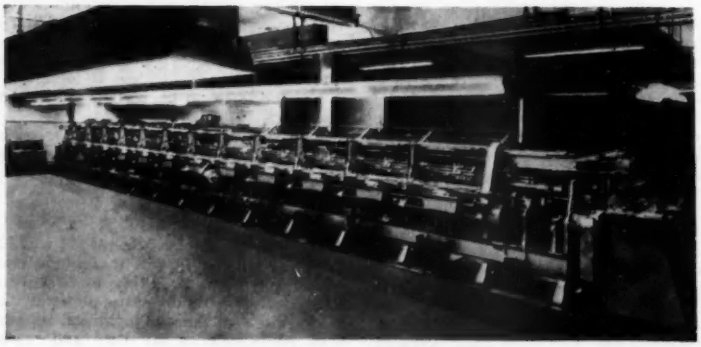
A new model of the CSQ 329 ribbon loom shown by **Jakob Muller,** Frick, Switzerland on **Stand No. 2005,** has several technical improvements including (*a*) new eccentric intermediate drive, (*b*) shuttle drive with dynamically improved cam, (*c*) eccentric mechanism for high rotational speeds, (*d*) quick-acting brake with practically constant stopping position and (*e*) electronic warp and weft stop motions.

The machine is designed for the production of ribbons with simple weaves in widths of ¼ to 10 in. It will handle rayon, silk, cotton, rubber and synthetic materials. It can also be equipped to take wide beams. Alternatively, the loom may be fitted with a conventional warping creel with individual warp bobbins for each group of threads. The weft stop motion, a Muller patent, stops the loom when there are still a few inches of yarn left on the weft bobbin, so that the weft thread does not need to be inserted afresh.

Muller also build the Rotor shuttleless looms. Features include simplicity of operation, run-off of weft yarn from large cones, extremely high picking rates and high efficiency. (The British agents are A. E. Aspinall Ltd., Manchester).

* * *

S. A. Monk (Sutton-in-Ashfield) Ltd., Stand No. 4008, show their newest model. The Supermatic, or Model S.M. which retains all the features offered by the Samcomatic fully automatic machine, but in addition brings all standard attachments under completely automatic control. Model S.M. includes a fully automatic neck fashioning device of the single carrier type, also drop stitch and automatic centre and collar marking but if single carrier V-neck is included, it would not be necessary to have the marking attachment, since the V-neck attachment could be utilized for marking purposes. A standard fitment on this machine is that of indexing the outer selvedge screws 1, 2 and 4 needle narrowing. Narrow width down to 16 needles on 21 gauge is introduced automatically. This model also comprises combined automatic rib transfer and automatic welt turning, or alternatively, automatic rib transfer alone. Tube type carriers will be standard equipment on Model S.M. and the carrier rods themselves will be kept in perfect alignment with the sinker bars by extra rod supports fitted in the centre of each division. The machine is built on an entirley new framework which embodies the driving shaft in the lower sections of the machine. This new model offers the facility of two types of electrical control for all automatic movements, fashionings etc.



End-to-end view of the Monk Supermatic SM

One of the two looms shown by **Texnovo S.P.A.,** Milan, on **Stand No. 4002** is the Ultratex 16/35, a 16 head, automatic needle weaving unit for producing elastic webbings up to 37 m/m (1½ in.) maximum width. This modern loom is equipped with the Texnovo cam box with 12 levers and 12 cams in repeat 1 : 8.

The second machine is the Ultratex 16/25, suitable for weaving rigid tapes and ribbons up to 25 m/m (1 in. maximum width). The 16/25 will be shown weaving a rayon satin ribbon. Both the 16/25 and the 16/35 are fully automatic and an electric warp and weft stop motion permits one weaver to attend up to ten of these needle weaving looms. The looms are supplied with a 1·8 h.p. self braking motor—the speed of the loom being 800 r.p.m. giving a total number of 25,600 single picks a minute for each sixteen head unit. (The British agents are Muschamp Textile Machinery (Sales) Ltd., Eider Works, Wellington Road, Ashton-under-Lyne).

* * *

The new "Camless" crochet lace machine, Type OE/10 in. gauge 18 needles per inch, with a working width of 100 cms. and 10 weft rods is displayed by **Kohler and Co., A.G.** on **Stand No. 2206.** This machine is especially suitable for the production of nylon lace edgings for underwear etc., As many separate bands as can be accommodated in the working width of the machine can be made at once, each with its own firm selvedges and ready for immediate use without any finishing process.

The new camless construction of the machine is said to allow speeds of 300 stitches/min. to be attained. The machine can be fitted with either latch or patent needles and various additional attachments are available. (The British agents are Kilbourn Martin Ltd., Sanvey Gate, Leicester).

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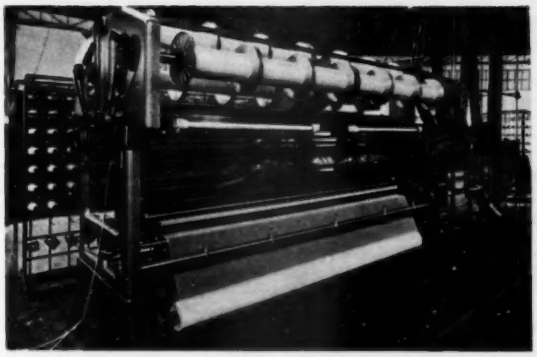
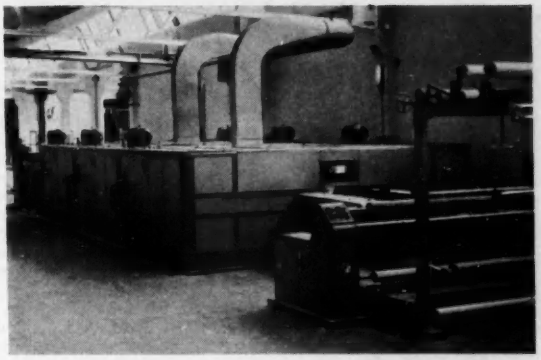
Theodor Groz and Sohne and Ernst Beckert, Stand No. 2311. Visitors to this stand will find an interesting display of latch and bearded needles produced by this company. (Kilbourn Martin Ltd. are the sole British agents).



One of the Mayer curtain Raschel machines of 124 in. width



Famatex gas heating equipment installed in a high production single layer stenter

On **Stand No. 3305, Karl Mayer G.m.b.H.,** Obertshausen, near Offenbach am Main, West Germany, show a series of machines, some equipped with bearded needles. others with latch needles. On view is a two-bar warp knitting machine with a maximum speed of 1100 c.p.m., a three-bar machine with a maximum speed of 800 c.p.m., and a four-bar warp knitting machine for the production of fancy patterned fabrics.

Latch needle Raschel machines with 14 and 24 bars for the production of lace edgings and allovers can be seen in operation, as well as a curtain lace Raschel machine equipped with 14 guide bars, for the production of patterned "Terylene" /marquisette, brise-bise and allovers. A 4-bar 48 gge. rubber Raschel machine incorporating a new eccentric drive is on show for the first time, in addition to a high speed direct warper with an electronically-controlled pressure roller mechanism and various ancillary machines and accessories. (The U.K. agents are Coltex Ltd., Rectory Place, Loughborough).

* * *

Shown for the first time the Model NK3.F high speed cone winder exhibited by **Franz Muller Maschinenfabrik,** München-Gladbach, produces knitting cones with a taper of 9° 15¹. Its winding speed ranges between 350 - 1,100 yd./min. A new feature on this machine, shown on **Stand No. 3407** is the winding element, a slightly tapered bakelite drum. The machine is equipped with a suction device and overhead blower, a tension device with double slub catchers and waxing arrangement, and conveyor belt for empty tubes. Muller also show their new automatic cone winder (circular type with 24 spindles). The spindles rotate past an automatic control station and the magazine. One motion ejects the empty tubes automatically and feeds in full tubes at the same time tying up the yarn end of the tube with the yarn end of the package. The second motion control is designed to attend to thread breaks, which occur on or above the yarn clearer. In such cases the broken end of the ring tube is picked up by the automatic knotter and retied to the broken end of the package.

Other machines on view are a high speed raising machine for knitted fabrics which can be raised at a maximum speed of 26 yd./min. irrespective of whether the fabrics are made of natural fibre or synthetics. A very sensitive tensioning arrangement has been incorporated and all operations on the machine are controlled by infinitely variable gears. The company's shearing machine for knitted fabrics is also displayed. (The British agents are G. W. Thornton and Sons Ltd., Cheadle).

* * *

Completely new approaches have been made in the design of F.N.F.'s latest machines exhibited by Hobourn-F.N.F. Ltd., on **Stand No. 4105**. Features include driving mechanisms built in easily exchangeable units; knitting adjustments simplified; new knitting elements; yarn let-off control achieved by dial settings; warp heights considerably reduced; capacity for 30 in. dia. beams, and bulk fabric batching. The machines are built for high production speeds.

* * *

On **Stand No. 5202, Famatex G.m.b.H.** Stuttgart-Kornwestheim, West Germany, show a single layer stenter. The chief design feature in the entrance field itself is the patented Famatex overfeed device. Practical demonstrations will show that extremely accurate pinning and selvedge control can be obtained over a very wide range of overfeed settings, even at high speeds. The machine demonstrated is equipped with a combination chain of pins and clips, each section of which runs on ball-bearings. Smooth operation is ensured with minimum power requirements and a minimum of chain lubrication. Periodically during operation, a thin film of oil is automatically spread at a predetermined rate on the bearings and chain, which are completely enclosed in the chain housing. (Represented in the U.K. and Ireland by Coltex Ltd., Rectory Place, Loughborough).

Croon and Lucke, Maschinenfabrick, Cologne, Germany, exhibit on **Stand No. 4305** their Model W.400.K. reeling machine, suitable for all kinds of yarn. The machine is equipped with extremely solid swifts, particularly suitable for high speed preparation of hanks or muffs of crimped yarn. Modern in every aspect the machine is complete with electrical stop motions, tachometer, rapid braking device. The linear speed is 1,000 yds./ min., allowing the manufacture of 3,500 yd. hanks.

The firm's semi-automatic balling machine is available in 10, 16 or 20 spindle models. This compact machine permits an automatic predetermination of weight between 20 and 220 grams. There is a special camming arrangement which allows all the usual ball patterns without any change gears necessary. It is complete with yarn cutting device, yarn traversing device, electric rapid braking device. Speed of flyers infinitely variable from 400 up to 850 turns/min. All gears run in an oil bath. (The British agents are Muschamp Textile Machinery (Sales) Ltd., Eider Works, Wellington Road, Ashton-under-Lyne).

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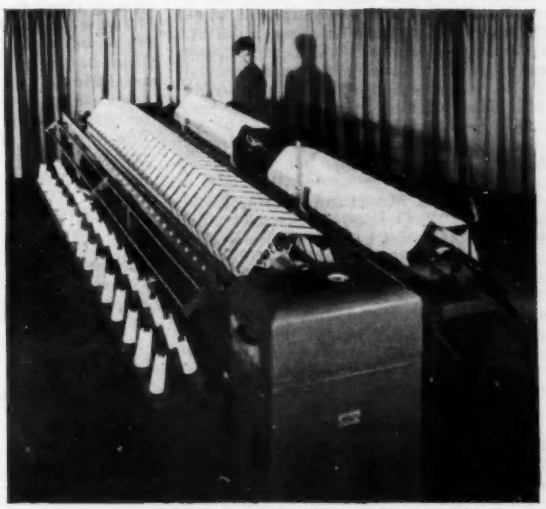
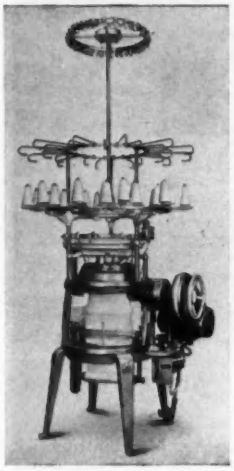
On **Stand No. 3103, D. Delerue and Cie,** Roubaix, France, exhibit a 6-spindle, Rocket winder which winds from hank ring, tube or cone, to a tensionless package 18 in. high 5½ in. diameter or 30 in. high, 5½ in. diameter which is suitable for pressure dyeing and for knitting.



The linear speed on this Croon and Lucke reeling machine is 1,000 yds./ min., allowing 3,500 yd. hanks



The Diamesh machine

Modern methods of production control, piecework-pay control, stock-control and sales promotion require hosiery and knitwear labels and work-tickets to bear information that is detailed and highly changeable. **Tickopres Ltd.**, 7 - 8 Old Bailey, E.C.4, are therefore showing on **Stand No. 3312** machines for overprinting variable detail on labels, tickets and tags. Electric powered Tickopres BM machines will be seen overprinting up to 130 self-adhesive and other lables or tickets a minute. One model has an automatic cutter which snips off labels as they are printed, whilst another model automatically rewinds printed labels on the reel. Other exhibits include in the Tickoply dispenser, Tickoply applicator, and the Tickomajor which can be seen overprinting dye-lot numbers, shade and other information on ball-bands.

* * *

So great has been the impact of nylon on the knitting industry that virtually all the machines now being built have been designed so that they are able to handle nylon yarns. This is one of the main points made by **British Nylon Spinners Ltd.**, on **Stand No. 3507.** The transformation of the last two decades, which has seen textiles with completely new ranges of properties come into daily use, has brought about many changes in manufacturing techniques throughout the textile industry. Nowhere has development been more rapid and adaptation of equipment more effective than in the knitting industry. Following changes first in stocking knitting and then warp knitting, the more general field of weft knitting is now being strongly influenced by synthetics such as nylon. Side by side with this development there have been important advances in dyeing finishing and making-up.

* * *

Erich Brock Maschinenfabrik, Limburg/Lahn, W. Germany, demonstrate on **Stand 3402** (Coltex Ltd.) their new clipping machine, Model BSM 3200. This has a working width of 124 in. and consists of a cutting mechanism, to which the fabric is led over a cutting table. Tensioning and width-holding ensure the correct presentation of the cloth itself, whilst a suction device aligns the floating threads to the cutting edge.

* * *

A. Kirkland and Co. Ltd., Leicester Road, Syston, nr. Leicester, display on their **Stand No. 3001**, a 30 in. dia. double jersey machine of new design, and also a 16 in. dia. Diamesh underwear fabric machine. The double jersey machine is fitted with a constant speed motor, speed variation from 13 to 28 r.p.m. being obtained by the variable speed drive. No hand-wheels are fitted, but a slow running motor of 1/3 h.p. is incorporated to give a crawling speed of less than 1 r.p.m. An inching motion can be obtained on either the fast or slow speed from push button control panels placed on either side of the two main supports. The drive to the knitting head is from a worm reduction unit through spur gears and a vertical shaft of generous proportions. Adjustment for rib or interlock gating is by means of set screws on the dial drive cross arm. Major rotating parts are on ball races. The machine is stopped by an electrical disc brake interconnected with the stop motions. The yarn packages are carried on a 36 end bobbin frame. The yarn from the packages is taken through measured feed units mounted directly above the packages. The drive to the measured feed units is provided by a shaft driven by a pick-off gear on the large dial drive gear. Yarn speed variations are obtained by substituting pulleys of suitable diameter on the single drive to all units.

The Diamesh machine is provided with latch needles in the cylinder and pelerines in the dial, and incorporates the feature of being able to collect, knit and transfer at every feeder position. Fabrics may be knitted on three sequences:—

(1) Collect/knit and transfer, producing what is known as single wrap Diamesh.
(2) Collect/knit, collect/knit and transfer, to give 2-wrap Diamesh.
(3) Collect/knit, collect/knit, collect/knit and transfer to produce 3-wrap Diamesh.

The machine is designed to knit, in addition to cotton, nylon, "Courtelle," "Courtolon", etc., being fitted with specially designed ceramics. The machine is fitted as standard, with four stage Triplite stop motion comprising top droppers, bottom droppers needle detectors and anti-roll-up. Control is from push buttons having start, stop and inch stations.

* * *

Liba Maschinenfabrik G.m.b.H., W. Germany (**Stand 2105**) exhibit three machines never before shown in Great Britain. They are the 2 bar Excentra warp knitting machine with a knitting width of 170 in. a 3/4 bar Excentra with a width of 84 in. bar and the new Mammut direct 50 in. beamer. Also shown will be a high speed 84 in. 2 bar Excentra.

Francesco Lonati, Brescia, Italy, have manufactured circular machines for many decades and three different types are available all having the same basic design features. These are:— an all steel short cylinder of 3¾ in. of exceptional rigidity, individual multi-speed motor when required slowing down momentarily to 120 r.p.m. and 60 r.p.m. thus providing for a considerable safety margin during yarn introduction the latest Solis pneumatic draw-off, standard elements to customer's choice (400, 420, 448), and automatic welt turning.

On **Stand No. 2202,** they also show for the first time the "Economic" model which can operate on a line shaft at 240 r.p.m. and is, in fact, a basic "Lonati" machine with certain design features. Expressly designed for tubular hose production, special design features provide for rapid conversion to the full selection multi-speed motor driven standard LC model "Lonati" machine. (Coates Smith Ltd., Nottingham, are the British agents).

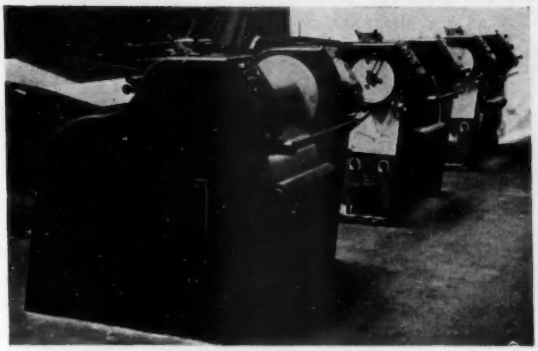
* * *

Trockentechnik, Kurt Brueckner KG, (Stand 2106), Stuttgart, W. Germany, exhibit part of a stentering, drying etc. machine consisting of a newly developed photo-cell feeding apparatus, 20 ft. entrance frame, one chamber designed for indirect oil circulating heating, exit frame with cooling zone and fabric take-up suitable for batching prior to beam dyeing, including selvedge cutting and exhausting mechanism (Coates Smith Ltd., Nottingham, are the British agents).

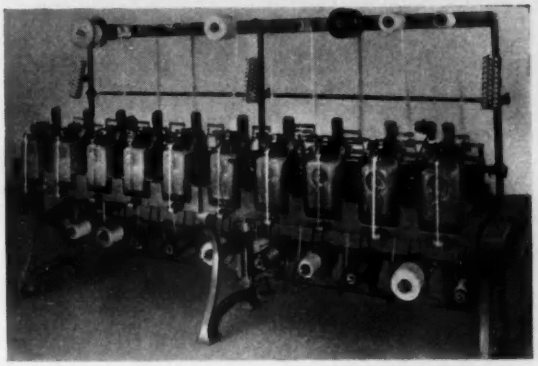
* * *

Meccanica del Nord (Stand 2203), Milan, Italy, specialise in automation to seamfree hose manufacture. Two machines offered are, the "Selecto-Finisher", well known to hosiery manufacturers and the "Down-Stream" a fully automatic conveying, controlling, selecting and production control system. The "Selecto-Finisher" consists of a control and inspection station. An electronically operated revolving turn-table gives inspection at a rate from 900/1,200 dozen pairs per week. The "Down-stream" collects seamless hose automatically from up to 60 twin-feed seamless hose machines. An electrical impulse which is, in fact, retained throughout each individual operation, opens and closes each valve separately, thus there can never be two stockings together in the pipe-line. (Coates Smith Ltd., Nottingham, are the British agents.).

One of the Liba warp knitting machines



An installation of three Type C Crowther Warpers



Saurer 10-head 24B single shuttle ribbon weaving loom

Crowther Ltd., Thurmaston, Leicester, show on **Stand Nos. 4111 and 4210,** a high speed direct warper type "C" for smallware and knitting beams up to 42 in. long and 21 in. flange diameter. Features include controlled constant speed within 1% up to 600 yd./min., control panel built-in, automatic movement of front reed maintains level warp-sheet during beam build-up and pressure roll systems for perfect beams.

* * *

H. Stanier and Co. Ltd. (Stand 2105), display one of their latest magazine creels, complete with H.S. tension/stop motion units and creel indicating lights. Important recent improvements include a further economy of space by careful designing of spindle positions, ease of accommodating current large B.N.S. and I.C.I. packages and a simple speedy means of loading. (Coates Smith Ltd., Nottingham, are the British agents).

* * *

Projectina Optical Works (Stand 2105), show their latest micro measuring instrument which has many applications in textiles. It will magnify from 7 to 3,000 times and give projection of all specimens on to a ground glass screen with simultaneous examination through a built-in eye piece.

* * *

Jagri Maschinen-Apparatebau, G.m.b.H., Westphalia, exhibit photographs of their new high temperature, static pressure dyeing installations for all types of yarn, and also for fabric on beam. In addition, a film illustrating a complete dyeing sequence carried out on one of their fully automatic controlled systems will also be shown. **(Stand 2203.)**

* * *

Automatic Control Developments (Sales) Ltd., show fitted to the Liba 170 in. Excentra machine the Detexomat fabric scanner shown for the first time at any exhibition. This instrument operates through photo-transistors and light source traversing above the fabric and stopping the machine automatically whenever a fault appears. **(Stand 2105.)**

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Lance Engineering Co. Ltd., display some of the wide range of welded sectional beams they manufacture. Cast flanges are welded by a special automatic process to extruded aluminium alloy barrels. **(Stand 2106.)**

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Van Engelen and Evers, show one of their well-known range of cutting and folding machines for woven labels. A full range of textile machinery accessories is available including yarn carriers in wood and hardpaper, textile testing instruments, counters. **(Stand 4111.)**

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Adolph Saurer Ltd., Switzerland, on **Stand No. 4209,** exhibit a multi-shuttle ribbon loom (Type 22Ba-62) for the first time. It is designed to meet the demand for a high speed semi-automatic multi-shuttle loom for ribbons, cotton tapes, elastics, light webbings, etc.

* * *

Oerlikon Machine Tool Works, Switzerland, on **Stand No. 4110,** show a Circular knitting machine for the production of Ladies' seamless hosiery, single and two feed, 3¾ in., 400, 420 and 472 needles.

* * *

Geoffrey E. Macpherson Ltd., West Bridgford, Notts. **(Stand 3103),** exhibit a range of yarns in cotton, wool and synthetic fibres, specially designed for knitting.

* * *

Dr. Ramisch and Co., Maschinenbau, Germany, show samples of tricot fabric with different effects, processed on their well-known schreiner and embossing calenders. **(Stand 3103.)**

* * *

Reggiani Divisione Macchine, Italy, will exhibit many examples of screen printing on 15 den. nylon, cotton, Acrylica, etc., also special display of scale model printing machine. **(Stand 3103).**

* * *

Kurt Ehemann, Germany, show the Type D59 steaming and setting machine, with boiler unit. Type K11. Designed for tension-free finishing, shrinking and decatizing, it has built-in illuminated inspection panel and plaiting device. A steaming table, Type SEA, with built in boiler is also on view **(Stand 3103.)**

* * *

Fabrique Nationale D'Armes De Guerre, S.A., show the new Quartex 4-feed 4 colour fully automatic machine for knitting men's and children's socks. Available in 84 - 204 needles in 3 in - 3¾ in. cylinder diameter, this machine will produce an automatically inturned welt or mock rib effect, also a cushion sole.

* * *

Vald. Henriksen l/s, Denmark, show a dyeing and bleaching machine, Type GRU, for temperatures up to 130°C for dyeing raw material, tops, hanks, cheeses, etc., also a universal precision jig, Type V.H.—Super. **(Stand 3103.)**

* * *

Hilber and Co. K.G., Germany, demonstrate open dial outerwear linkers of gauges 5/5, 7/7, 12/12 and 14/15 point featuring interchangeable dials. **(Stand 3103.)**

* * *

Parkson Engineering Co., Chatham, Kent, exhibit the Type-50 cone winder pressure unit which enables a large capacity stable cone to be wound on the Type-50 cone winder. They also show their latest front line oiling attachment and muff winding attachment. **(Stand 4013.)**

* * *

Carrington and Dewhurst Ltd., Eccleston, exhibit the Bourgeas-Pain uptwister manufactured under licence by them in this country. They also show their latest high speed winding machine for re-winding of 2 lb. nylon and "Terylene" supply packages on to a 2 lb. parallel double flanged bobbin. **(Stand 4013.)**

* * *

Textile Automatics, Leicester, show the Autofold junior machine for cutting and folding of woven and printed labels. This machine is capable of processing end folds and mitre folds. (E.G.K. Textile Machinery and Accessories Ltd., are the British agents). **(Stand 4013.)**

* * *

Kilbourn Martin Ltd., England, on **Stand No. 2310,** display many different types of trucks for carrying all sizes of yarn packages. Waggons, trolleys, warehouse trucks and other mobile units will also be on view. The wide use of plastics in the hosiery trade is emphasized by a comprehensive layout of various work containers, transparent stacking boxes, troughs, polythene waggons, dyehouse buckets and tubs, hose inspection forms, tables, grading racks, seaming machine chutes, oil trays for double-cylinder machines, examining irons, hose containers for seamless hose machines, bottle bobbins and other small parts.

• • •

On **Stand No. 2205, Eugen Bellmann G.m.b.H.,** introduce their new "Junior" Colorplast machine. (The British agents are Kilbourn Martin Ltd., Sanvey Gate, Leicester).

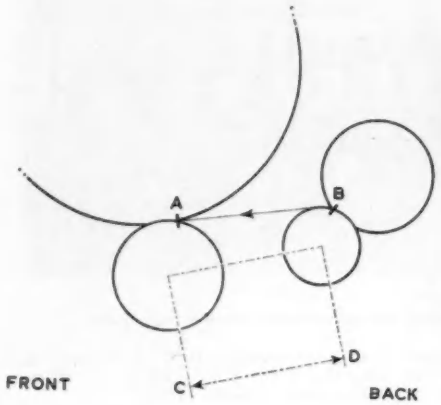
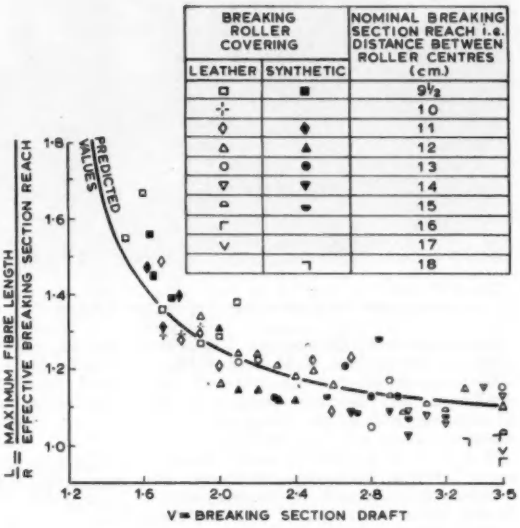


Fig. 2 (left). Sketch of the breaking section of a Seydel machine, with exaggerated roller deformation, showing the effective reach AB and the nominal reach CD.

Fig. 3 (right). The scatter of experimental points above the values predicted by the equation $L = R\left(1 + \frac{0{\cdot}25}{V - 1}\right)$



Stretch Breaking Tow on a Seydel Machine*

A PREVIOUS report (No. 27) which gave the results of trials made on a Seydel tow-breaking machine showed that many changes in machine settings were possible, and indicated the effects of such variations. Subsequent work at B.N.S., Doncaster has consolidated certain information, now reported here.

The lengths of the fibres in sliver obtained from the Seydel machine need to be compatible with (*a*) the design characteristics of the machinery used to convert the sliver into yarn and (*b*) the requirements of the finished yarn. Thus, users of B.N.S. nylon tow (100,000 den., 1½ den. per filament) on the Seydel machine will wish to control maximum fibre length and, so far as possible, mean fibre length. Both can be assessed from a fibre length distribution diagram as shown in Figure 1 (ignoring the occasional overlength fibres which might occur in a very random manner.)

* *Advance report* (43) *issued by B.N.S. Ltd.*

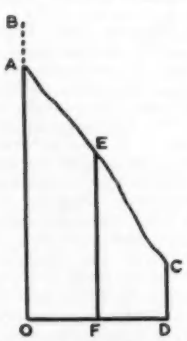


Fig. 1. Fibre length distribution diagram of Seydel sliver showing the maximum fibre length OA, the occasional overlength fibre(s) OB, which may or may not be present, and the mean fibre length EF,

where $EF = \frac{\text{Area OACD}}{\text{OD}}$

Maximum Fibre Length

Maximum fibre length can be controlled by using suitable breaking draft and breaking reach (or roller settings in the breaking section). To assist in this, use may be made of the following formula (proposed by W. Frenzel and Stover, Faserforschung und Textiltechnik, 1956, June, 241 - 251):—

$$L = R\left(1 + \frac{E}{V - 1}\right)$$

where L = maximum fibre length (OA of Fig. 1)
R = effective breaking section reach (AB of Fig. 2)
E = fractional extensibility of the portions of filaments in the breaking section, including any recovery they might have achieved after the immediately previous breakage, and
V = breaking section draft (No. 6 P.I.V. setting of report No. 27).

By reference to Fig. 2, R can be determined by measuring the distance between carbon paper impressions of the front edge of the back nip and the back edge of the front nip on a sheet of paper held taut across the nips.

The value of E is variable between materials but within any one material it is likely to be constant. For B.N.S. 100,000 den. (1½ d.p.f.) tow now being supplied on a commercial basis, an average value of 0·25 has been determined empirically. Fig. 3 illustrates some of the many trials included in this average value. Put another way, 26 trials using synthetic-covered top front breaking rollers gave an average value of 0·248, 44 trials using leather-covered rollers gave an average of 0·252 and 56 assorted trials showed an average of 0·251.

Thus, the formula relating maximum fibre length L breaking draft V and breaking reach R becomes

$$L = R\left(1 + \frac{0{\cdot}25}{V - 1}\right)$$

Mean Fibre Length

Unless the amount by which the tow is stretched, prior to its entering the breaking section, is too low, the mean fibre length is: maximum fibre length multiplied by 0·5 - 0·6 (*where leather covered top front breaking rollers are used*) and, maximum fibre length multiplied by 0·4 - 0·6 (*where synthetic-covered top front breaking rollers are used*).

When the overall draft in the stretching section falls below about 1·53, the proportion of short fibre increases. A large amplitude periodic variation in sliver linear density also appears. Advance Report 27 included further information regarding the distribution of fibre length. In normal running, with an overall draft in the stretching section of about 1·60, the ratio of the mean fibre length to the maximum fibre length, with the single breaking operation covered in No. 27 is fairly constant and is within the ranges given above. Work we have in hand may indicate a means of increasing the above ratios.

THE TEXTILE
COLOURIST & FINISHER

Recent Progress in Dyeing and Finishing Techniques

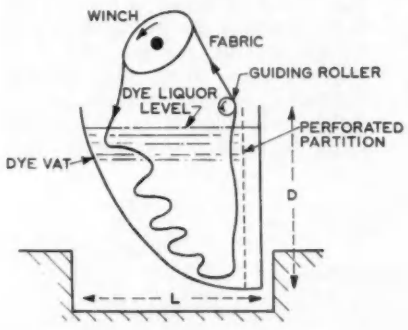
Details of some new methods for dyeing triacetate fabrics, improvements in comprehensive shrinkage techniques, recent researches on polyester fibres, the production of new anti-static agents, and the dyeing of polyester materials

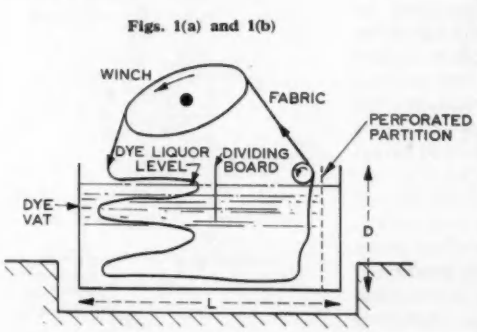
By B. C. M. DORSET

FOR many years the winch has been an exceptionally useful machine for dyeing knitted fabrics especially those made from viscose or acetate yarns yet, curiously enough, only minor improvements have been made to its original design in the last forty years or so. Recently, however, a new form of construction has been proposed and is applicable especially to winch machines used for scouring or dyeing fabrics knitted from acetate yarns. It is claimed that the new type of machine allows the fabric to pass more lightly over the winch yet without slippage such as may ordinarily lead to the formation of undesirable creases—a crease formed in an acetate fabric may be permanent or very difficult to remove.

Quite early the winch machine was made in two main types. That type expected to be used for cellulose fibre materials, say cotton and viscose rayon, had a deep somewhat narrow dye vat, while in the machine for acetate fabrics the vat was much shallower. These two types are shown in Figs. 1(*a*) and 1(*b*). In the first, the ratio of length (L)-to-depth (D) is generally about 1:1 while in the second type this ratio is much greater, say 3 to 5:1. The reason underlying this difference is that acetate fibres have a low density and so any entrapped air in the fabric (this may be tubular) easily causes the fabric to float in the dye liquor whereas it would be better for it to sink and so become more evenly penetrated by the liquor. Viscose rayon and cotton fabrics usually sink in the dye liquor whether or not they have entrapped air since the fibres are denser. It is a further fact that when acetate fabrics are being drawn over the winch during dyeing they may, by slippage on the winch, acquire a patchy glazed appearance.

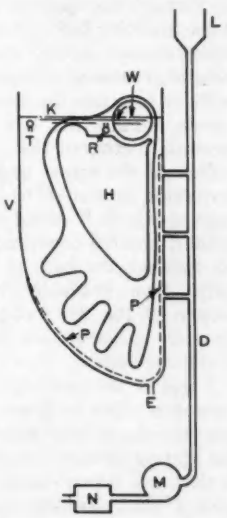
Fabrics for dyeing in a winch have the two ends sewn together to form an endless band enclosing the winch. Then, during the dyeing process, these fabrics side-by-side are continuously drawn upwards by the rotating winch out of the dye liquor at the front of the machine to pass over a rotating guiding roller and then over the winch to fall back into the liquor at the back of the machine—this movement through the liquor continues throughout the dyeing process. By contrast it may be noted that in dyeing fabric in a jigger the fabric is out of the dye liquor most of the time. An early improvement in the





Figs. 1(a) and 1(b)

Fig. 2



winch machine was to drive the guiding roller positively; previously it was simply rotated by the fabrics passing over it and thus an undesirable drag could be exerted on the fabric and lead to its slippage while passing over the winch which is rotated at a positively driven uniform speed.

Now Mann and Noon of British Celanese Ltd. (B.P. 864,092) have re-designed the winch to make it especially suitable for dyeing acetate fabrics and, as shown in Fig. 2, it is quite different from the usual type of machine. The dye vat of the new type of machine is deep with the L/D ratio as low as 1/1 or even 1/2 and with a circular (not elliptical) winch mounted —not high above the dye liquor as is usual—but at dye liquor level or even partly or wholly submerged. A further improvement is that the dye liquor is circulated by means of a pump throughout the dyeing process.

The new machine consists of a comparatively narrow and deep dye vat *V* containing dye liquor to level *K* and also a positively driven rotating winch *W* whose surface is completely covered so as not to admit dye liquor; the winch is preferably fully submerged in the dye liquor. The dye vat has a perforated false bottom *P* which extends from a point mid-way up the back of the dye vat and up the front of the machine. The front of the machine is in communication at three spaced points with a vertical pipe *D* at the top of which is a funnel *L* to allow the addition of dye solution from time to time during the dyeing.

The lower end of *D* connects as also does outlet *E* below the perforated false bottom *P* to a liquor circulating pump *M* and any suitable indirect dye liquor heating device *N*. Extending through the machine from one end to the other is a baffle *H* into which dye liquor cannot enter. The use of this somewhat curiously shaped metal sheet baffle is to guide the fabric(s) *F* as it moves around the dye vat passing upwards between the front of the baffle and the upper part of the false perforated bottom *P* to pass over the rotating winch *W* along the top of the baffle *H* and fall downwards in the dye vat between the back of this and the baffle thus gradually reaching the bottom of the dye vat to again pass upwards to commence a new circuit of the machine.

T and *R* are two important slotted horizontal pipes in direct communication with the delivery side of the pump and heating device; they are positioned so that dye liquor issues downwards from *T* thus assisting the downward movement of the fabric while the liquor flow from *R* is upwards and away from the specially ramp-shaped top of the baffle *H* thus deflecting the fabric away from the winch and assisting the travel of this fabric over the winch towards the back of the machine. Under such circumstances not only is the travel of the fabric being dyed around the machine assisted so as to be uniformly submerged and freely exposed to the dye liquor but this latter is maintained uniform in composition because of the pump even when dye additions are made from time to time.

It has been found that the new and unconventional winch dyeing machine described above is very suitable for dyeing thick and rigid acetate fabrics which in an ordinary winch machine tend to acquire permanent creases—the assisted movement of the fabric in the new machine obviates crease formation. Another feature of the machine is that the fabric need not rise out of the dye liquor during dyeing so that in applying dyes sensitive to atmospheric oxidation any risk of patchy dyeing may be avoided. It is also easier to maintain the dye liquor at a high temperature since there is less exposure of the dye liquor and fabric to the cold surrounding air.

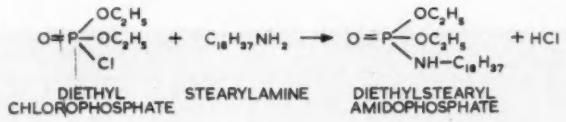


Fig. 4

Anti-static Agents

German research has recently shown that the tendency for synthetic fibres such as polyamide and polyester fibres to accumulate electrostatic charges during their mechanical manipulation can be much reduced by applying to them a small proportion say 0·1 to 2·0% of certain new amido-phosphoric acid esters which conform to one or other of the general formulae set out in Fig. 3 in which *R* and R^1 represent alkyl, aryl, aralkyl or hydroaryl radicals. Treatment of the fibres or other materials is preferably effected at a temperature of 40 to 60°C. with an alcoholic or benzene solution of the selected agent and thereafter the fibres are dried at 90 to 110°C. Fibres so treated do not acquire an electrostatic charge during carding so that this stage in their manufacture into yarns can be greatly facilitated with minimum fibre breakage and loss.

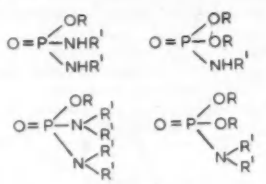
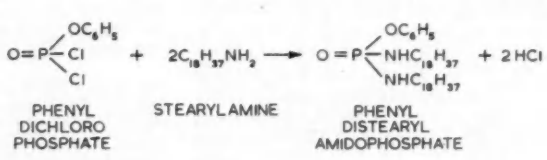


Fig. 3

The tendency of fibres to accumulate electro-static charges is proportional to their electrical resistance and this can be conveniently measured by means of a Slevogt multimegohmeter. It had been established that synthetic fibres such as those made from polycaprolactam and polyethylene terephthalate behave satisfactorily during carding because of their low electrical resistance if the value of this is less than 500×10^9 ohms. Fibres treated with the new anti-static agents develop an electrical resistance much below this value.

The new agents which comprise such products as diethylstearyl amidophosphate, diethyloleylamidophosphate, ethyl dicyclohexylamidophosphate, and di-ethyl-di-2-ethylhexylamidophosphate can be made as described below. An agent such as diethylstearyl amidophosphate is made by reacting diethyl chlorophosphate with stearylamine in the presence of pyridine as shown in Fig. 4.

Phenyl di-stearylamidophosphate is made by reacting stearylamine with phenyl dichlorophosphate in the presence of pyridine as indicated in Fig. 5. The function of the pyridine is to neutralise the hydrochloric acid formed in the reaction and it is convenient to bring the reactants together in a liquid medium such as carbon tetrachloride or chloroform. Since the reaction is exothermic it is



(right) Fig. 5

necessary to cool the reaction mixture so as to maintain it at about 30°C. The resulting anti-static agent is insoluble in hot water and this allows it to be conveniently separated from the residual volatile or soluble products left in the reaction mixture.

The treatment of the synthetic fibres is relatively simple. Thus Perlon (polyamide) staple fibre is treated at 40°C. with a 1% solution of di-stearyl amidophosphate and then squeezed or hydro-extracted to leave a 15% pick-up of solution; it is then dried at 105°C. The resulting fibres may have an electrical resistance of only 73×10^9 ohms and thus give no electro-static troubles during their subsequent carding.

Dyeing Triacetate Fabrics

Considerable quantities of ordinary acetate (cellulose di-acetate which is acetone-soluble) fabrics are dyed, especially for the production of black colourings, by a process in which a diazotisable base (amine) is first applied, followed by diazotisation on the fibre of this base, and then a suitable coupling naphthol is applied so that an azo dye is formed within the fibres. Thus the bases 4:4¹-diamino-1:1¹-benzene-azo-naphthalene and 4-amino-4¹-dimethylamino-azo-benzene have been much used in conjunction with 2:3-hydroxynaphthoic acid for producing black shades. It might have been anticipated that the same dyeing operation applied to tri-acetate materials would have produced similar satisfactory colourings but in fact the resulting shades are often unsatisfactory and the shade may be very different from the full black shade readily obtained on ordinary acetate fibres. It is also found that the dyed tri-acetate fabric contains decomposition products arising from the diazotised base and that these bleed-out on to any un-coloured fabric which may be in contact with the wet dyed tri-acetate fabric.

The above-mentioned difficulties may now be overcome (B.P. 867,203) by using as the diazotisable base 4:4¹-diamino-2-acetylamino-5-methoxy-azo-benzene instead of the other two bases also mentioned above. This new base having the formula shown in Fig. 6, is conveniently made from 4-nitro-2-acetylamino-5-methoxy-4¹-amino-azo-benzene by reducing this with sodium sulphide at about 70°C. It allows the production of navy-blue and black shades the latter requiring about 50% more of the new base to be used than the former. It would appear that the advantage of 4:4¹-diamino-2-acetylamino-5-methoxy-azo-benzene over 4:4¹-diamino-1:1¹-benzene-azo-naphthalene stems from the enhanced stability of its diazo compound.

In dyeing black and navy-blue shades on triacetate fabrics it is possible to use either of two methods. In the first, application of the 4:4¹-diamino-2-acetylamino-5-methoxy-azo-benzene, diazotisation, and coupling with 2:3-hydroxy-naphthoic acid follow each other separately in succession whereas in the second method the base and the naphthol are applied separately one after the other and then follows diazotisation so that diazotisation and coupling take place simultaneously.

The following method is recommended for dyeing a navy-blue shade using the first method. The triacetate fabric is entered into a dyebath prepared with 8% (calc. on fabric) of a 12% aqueous paste of 4:4¹-diamino-2-acetylamino-5-methoxy-azo-benzene and 0·25 g./litre of soap and 3 c.c./litre of a 9/1 mixture of Turkey Red Oil and xylene. Dyeing commences at 50°C. and the temperature is raised to 90°C. within 30 min., and maintained for 2½ hrs. at this temperature. The fabric is rinsed and diazotisation effected by treatment for 1 hr. at 25°C. in a bath containing 5% of sodium nitrite and 20% of hydrochloric acid (32° Tw.) both calc. on fabric. Rinsing follows with slightly acidified cold water and the fabric is then introduced into a coupling bath prepared with 1·5% of 2:3-hydroxy-naphthoic acid and 0·5% of caustic soda (calc. on fabric), and 1 c.c./litre of Dispersol VL (I.C.I.) with the bath then brought to pH 4·5 by addition of formic acid. The temperature is raised to 75°C. in 30 min. and maintained for 1 hr. when coupling of the diazotised 4:4¹-diamino-2-acetylamino-5-methoxy-azo-benzene with the 2:3-hydroxy-naphthoic acid within the fibres is complete. Loosely adhering dye is removed by a hot soaping.

When a black shade is required the above procedure is employed except that dyeing is carried out using 25% of the 12% aqueous paste of the new base and the proportions of 2:3-hydroxy-naphthoic acid and caustic soda are increased to 3% and 1% respectively. If the triacetate fabric is dyed in a swollen state then the rate of dyeing can be much increased.

Attempts to discover other 4:4¹-diamino-azo-benzenes superior to the 4:4¹-diamino-2-acetylamino-5-methoxy-azo-benzene have not been successful so far. Those bases which contain two methoxy groups in the ortho-position to the azo group such as 4:4¹-diamino-2¹:5¹-dimethoxy-azo-benzene and 4:4¹-diamino-2:2¹:5¹-trimethoxy-azo-benzene have, for example, been found very sensitive to copper and other metals so that unsatisfactory dyeing may result from using them in dyeing machines which contain these metals where they can come in contact with the dye liquor.

Improved Compressive Shrinkage Machine

Use is now being made of a type of compressive shrinkage machine for closing up fabrics lengthwise until they show no tendency to shrink in washing as shown in Fig. 7. It is seen to comprise three rollers *A*, *B*, and *C*, suitably mounted on shafts which turn in bearings mounted on two side frames. Roller *C* is positively driven

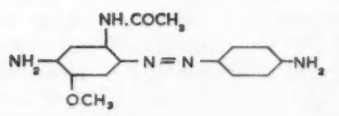


Fig. 6

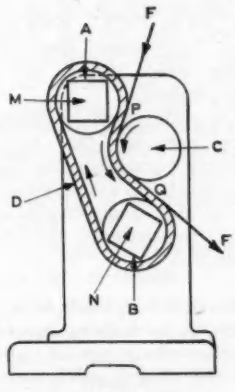


Fig. 7

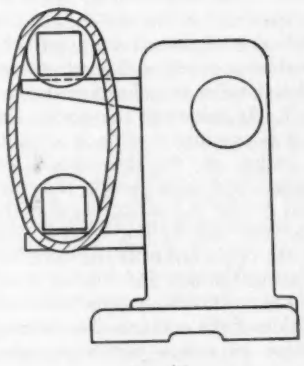


Fig. 8

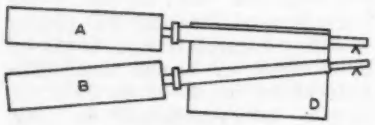


Fig. 9

while rollers *A* and *B* rotate freely. A thick rubber belt *D* runs round rollers *A* and *B* and is suitably pressed by roller *C*. When roller *C* is driven the belt is propelled forward and in passing around rollers *A* and *B* it causes these to rotate also.

When a machine of this type is working the fabric *F* to be shrunk to a controlled degree is fed in at *P* to emerge at *Q* and because of the special deformation of the thick rubber belt at *P* and *Q* the fabric is closed-up in length by an amount which depends on the thickness of the belt, the diameter of the roller *C*, and on the pressure exerted by roller *C* against the belt. There are other contributory factors.

Experience in operating such a compressive shrinkage machine shows that from time to time the belt must be changed because the rubber, under the drastic conditions employed, has but a limited useful life. But with the usual construction of this type of machine it is a very complicated matter to take out the heavy rollers to allow the belts to be taken off the rollers and be replaced by new belts. In fact it may take a whole day to again bring the machine into operation. It is thus of interest to note (B.P. 863,979) how this operation may be much simplified and accelerated by modification of the construction of the machine.

The essential feature of the modification is that the bearings *M* and *N* for the rollers *A* and *B* can be moved away from the side frames while still carrying the rollers and then be temporarily supported as shown in Fig. 8. Axial extension to the rollers are then fitted so that the ends of these can also be supported temporarily but with the upper roller *A* horizontal and the lower roller *B* inclined as shown in Fig. 9. At this stage the belt is slack and it is possible to slide it along the top roller on to the upper axial extension and so be clear of the rollers *A* and *B*. All the operations may then be carried out in the reverse order with the opportunity at the same time to remove the belt and replace it by a new one. Obviously this new construction of the compressive shrinkage machine expedites belt replacement very considerably.

New Polyester Fibres

Although Dacron and "Terylene" fibres made from polyethylene terephthalate are proving to be a very useful type of polyester fibre there remains the possibility that further research will show the way to producing similar fibres of even greater usefulness. This is supported by the recent discovery in Germany of new fibre-forming polyesters characterised by yielding fibres having a melting point which may be in some cases nearly 100°C. higher than that of "Terylene" and Dacron.

The new polyesters are made (B.P. 863,704) by polycondensation of a dihalide of an aromatic dicarboxylic acid (more particularly terephthalyl and iso-phthalyl dichlorides) with a di-hydric phenol in which the hydroxyl groups are separated by at least three carbon atoms (more particularly the dihydroxy-diaryl-methanes in which the carbon atom of the methane radical is substituted by one and preferably by two aliphatic radicals). In general, the polyesters made from isophthalyl dichlorides have somewhat lower melting points than those made from terephthalic acid.

In a typical instance dimethyl-bis-(4-hydroxyphenyl)-methane is condensed with terephthalyl chloride in anhydrous ortho-dichlorobenzene used as a diluent liquid. The reaction takes the course shown in Fig. 10. The

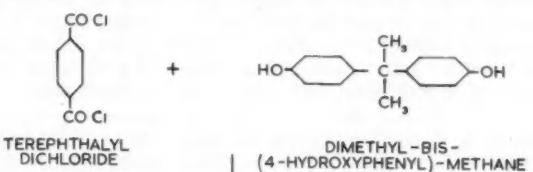


Fig. 10

corresponding polyester made from isophthalyl dichloride has a melting point of 260 to 270°C. Both types of polyester have good fibre-spinning properties when using the melt-spinning method.

It is an advantage of these new polyesters not only that they have high melting points but that they are distinguished by an extraordinary high stability to high temperatures and by their high transparency and freedom from colour.

Divinyl Sulphone as a New Cross-linking Agent

Some ten years ago it was discovered that divinyl sulphone having the formula $CH_2 = CH.SO_2.CH = CH_2$ was reactive towards cellulose and thus towards such fibres as cotton and viscose rayon. In particular it was found that the divinyl sulphone cross-linked the cellulose molecules to make the cellulose insoluble in cuprammonium solution. In its simplest form the reaction can be represented as shown in Fig. 11.

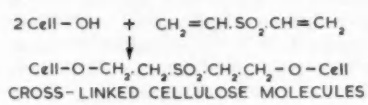


Fig. 11

It is now well known that most of the finishing treatments used to give cotton and rayon crease-resist and wash-and-wear properties are based on the application of agents which can effect a cross-linking of the cellulose molecules and so it became likely that this new agent could be similarly effective and perhaps take the place of the urea- and melamine- formaldehyde resins now in common use.

Unfortunately divinyl sulphone itself much resembles mustard gas in respect of its harmful action on human beings. It is extremely toxic both when inhaled or absorbed through the skin and it is a powerful lachrymator. As a liquid having a b.pt. of 234°C. it has a strong vesicant action and causes severe and persistent burns. From these facts it would appear that divinyl sulphone could be of little use in textile finishing for producing say crease- and shrink-resist finishes. But recently Tesoro, Linden, and Sello (J. Text. Res., 1961, **31**, 283) have re-investigated the textile finishing possibilities of divinyl sulphone and made the important discovery that it can be used satisfactorily in the form of derivatives which are free from all the disadvantages of the divinyl sulphone itself mentioned above. In fact, it has been shown that these selected derivatives can be employed to give finishes which compare well with those obtained when using the

resins and other agents now in common use.

Suitable derivatives of divinyl sulphone are of the types:—

1. $Y\text{-}CH_2CH_2SO_2CH_2CH_2Y$ where Y is derived from a strong acid (ionisation constant $>10^{-5}$)
2. $ZCH_2CH_2SO_2CH_2CH_2Z$ where Z is derived from a weak organic base (ionisation constant $>10^{-5}$)
3. $CH_2=CHSO_2CH_2CH_2NRNCH_2CH_2SO_2CH=CH_2$ where -N-R-N- is derived a bis-secondary amine

Type 1 derivatives can be made from sodium, potassium, and ammonium thiosulphate to have the formula

$M\,SO_3S\text{-}CH_2CH_2SO_2CH_2CH_2\text{-}S\text{:}SO_3\,M$

in which M represents Na, K, or NH_4. Pyridinium derivatives are of Type 2 and can be represented by the formula

$Cl.CH_2N\text{-}CH_2CH_2SO_2CH_2CH_2N.C_5H_5Cl$

Type 3 derivatives are made from piperazine and have the formula given in Fig. 12.

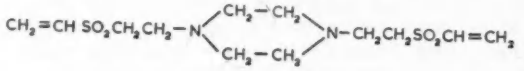
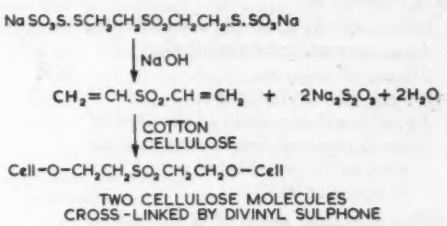


Fig. 12
Type 3.

The reaction of the divinyl sulphone derivatives mentioned above with cellulose takes place readily in the presence of an alkali such as caustic soda and the rate of the reaction is largely governed by the nature and amount of the alkali used. It is presumed that in such treatment of cellulose fibres with a divinyl sulphone derivative, say a derivative of Type 1, this splits up with regeneration of the divinyl sulphone itself thus allowing this to react with the fibres and cross-link the cellulose molecules. Thus the sequence of chemical reactions involved in applying the sodium thiosulphate derivative in the presence of caustic soda may be postulated as shown in Fig. 13.

The reaction takes place so readily that the process may be carried out at room temperature. Thus a typical treatment may consist of padding air-dry cotton fabric with an aqueous solution of the divinyl sulphone derivative, drying at 160 to 220°F., then padding with an aqueous solution of caustic soda and batching the fabric and allowing it to lie at room temperature for about one half-hour during which period the cross-linking action is completed. Thereafter the fabric is neutralised with dilute acetic acid and is finally well washed. In general an optimum ratio of caustic soda to divinyl sulphone derivative should be employed and this is generally about 1·0 when the padding solution contains say 25% of the divinyl sulphone derivative.

As a result of such treatment cotton fabric conditions can be employed which allow an almost theoretical increase of weight arising from the combination of the divinyl sulphone with the fibre. Further modifications which occur are as follows. The cotton acquires an increased affinity for moisture so that after conditioning at 70°F. and 65% R.H. it has a regain of 11% to 12·5% according to the variation of weight gain (from combination with divinyl sulphone) from say 6% to 12% (the regain of ordinary cotton is 6·5%. The cotton suffers losses of tensile and tear strengths which are comparable to those met with in the crease-resist finishing of cotton with resins but if softening agents are added to the divinyl sulphone padding liquor (polyethylene emulsions are most effective) then these losses are considerably reduced.



(right) Fig. 13

Cross-linking of the cotton cellulose molecules with divinyl sulphone gives the fabric complete resistance to shrinkage during ordinary laundering treatments even if repeated many times. The cross-links are completely stable towards oxidising agents and exposure of the cross-linked cotton fabric to high concentrations of peroxide and chlorine bleaching agents at elevated temperatures does not change the sulphur content (this is a measure of the amount of combined divinyl sulphone) or the modified properties of the fabric. The treated fabric does not absorb chlorine from hypochlorite whitening liquors and does not yellow as do resin-finished cotton fabrics.

The cross-links are very fast to acid treatments but are sensitive to alkalis. Actually the treated fabric has an increased resistance to attack by acid degrading treatments. Important are the improved wash-and-wear properties of the treated cotton fabric—it has a higher resistance to creasing in the dry and particularly in the wet state and even after 20 or more home launderings the wash-and-wear properties are not diminished.

It has been mentioned that divinyl sulphone itself is a very toxic and dangerous chemical but in spite of this fabrics made crease- and shrink-resistant and given wash-and-wear characteristics by treatment with the divinyl sulphone derivatives mentioned above are non-irritating and are not harmful when worn next to the skin. From the results noted above it would thus appear likely that this new cross-linking agent for cellulose might well be developed for finishing cotton and rayon fabrics in the near future so as to complete with the various resins and other products now in use.

Dyeing Polyester Materials with Insoluble Azoic Dyes

The well-known process which has long been applied to polyester materials of producing a fast colour within the fibres by first applying a diazotisable base (amine) and a naphthol and then diazotising the base so that it can almost simultaneously couple with the naphthol to give an insoluble azoic dye has proved very useful but is subject to defects. Thus the resulting dyeing may contain some residual base which has not been converted into the dye and also some residual amounts of the naphthol which has escaped coupling. The former residues can cause trouble in any high temperature treatment to which the dyed material may subsequently be exposed by subliming while the latter residues may dull the shade and reduce the fastness of the colouring. Recently German research has indicated (B.P. 863,329) how such difficulties may be avoided. Thus instead of using two components for producing the dye it is now found better to use only one which is capable of diazotisation and thereafter is able to couple with itself. The resulting dyeings are distinguished by having very good fastness to sublimation so

that any high temperature treatment does not impair the colouring.

The diazotisable self-coupling products to be used in such a dyeing process are arylamides of 2 : 3-hydroxynaphthoic acid and 2-hydroxycarbazole-3-carboxylic acid, and an acylacetic acid and it is, of course, necessary that they carry a diazotisable amino (NH_2) group. This latter group may be present either in the arylamide radical or in the radical of the ortho-hydroxycarboxylic acid or acylacetic acid.

The following example illustrates how this method of dyeing polyethylene terephthalate ("Terylene," Dacron, etc.) yarn or fabric can be carried out.

Firstly, the following dye liquor is prepared:—

2 g. of 1-(2^1:3^1-hydroxynaphtholyamino)-3-aminobenzene are dissolved in a mixture of

0·7 c.c. of 32½% caustic soda solution
3 c.c. of tetrahydronaphthalene
0·5 c.c. of diglycol
0·5 c.c. of butyl alcohol
1 g. of a wetting agent of the type of an alkylphenyl sulphonate and the solution is then diluted with 1 litre of water at 95°C.

The polyester material is treated in the above liquor for 1½ hrs. at 95 to 100°C. with the ratio of fibre/liquor of 1/30 and during the treatment addition is made of 0·8 g. of tartaric acid diethylester. The polyester material is then withdrawn, rinsed, and entered into a diazotising bath prepared with 3 g. of sodium nitrite and 5 g. of conc. sulphuric acid per litre. The temperature is raised to 85°C. and so maintained for one half-hour. In this stage of treatment the arylamide becomes diazotised and then couples with itself to form a bright red insoluble dye as indicated in Fig. 14.

The resulting dyed material is finally freed from any loosely adhering dye particles by an after-treatment for 15 min. at 90°C. in a liquor containing per litre 1 g. of a non-ionic dispersing agent (for example) the condensation product of 1 mole of iso-dodecylphenol with 10 moles of ethylene oxide), 4 c.c. of 32½% caustic soda solution, and 1 g. of sodium dithionite, and then rinsing. Thus is obtained a brilliant red dyeing having especially good fastness to sublimation, washing, and cross-dyeing.

Quite a wide range of colourings can be produced on polyester fibres by this new method of dyeing and some are indicated in Table 1.

Table 1.

Product applied to polyester material	Shade obtained by diazotisation and self-coupling
1-(2^1:3^1-hydroxynaphthoylamino)-2:5-dimethoxy-4-nitrobenzene	Blue
" -2-methoxy-5-nitrobenzene	Claret
" -2-methyl-3-nitrobenzene	Yellowish red
" -2-methyl-5-nitrobenzene	Red
" -3-methyl-4-nitrobenzene	Violet
" -3-methyl-5-nitrobenzene	Yellowish red
" -2-methoxy-5-methyl-4-nitrobenzene	Bluish red
" -3-methoxy-4-nitrobenzene	Violet
" -2-methoxy-4-nitrobenzene	Violet
1-(2^1-hydroxycarbazole-3-carboylamino)-3-nitrobenzene	Yellowish brown

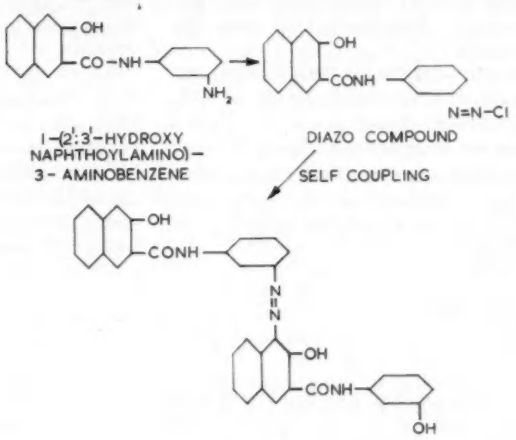


Fig. 14

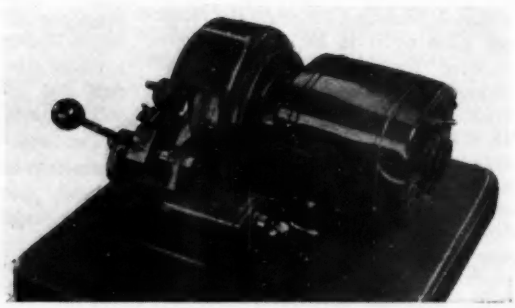
New Traverse Grinder for Loopers

GOOD tufting depends on good loopers and if these are cared for pile regularity may be expected. Inevitably, however, the loopers become worn by the passage of yarn over them and by the action of the knives and eventually they have to be re-ground to ensure that loops are cut completely and evenly.

British Tufting Machinery Ltd., Whitebirk Drive, Blackburn, have introduced a new precise looper grinder which may also be used for sharpening knives. A reciprocating arm is incorporated in the new grinder and this is said to give the stone a longer life. This arm, pivoted at two points, is at all time parallel to the grinding face of the stone. The same arm carries the diamond for stone dressing, so that the stone is dressed in direct relationship to the arm and the loopers or knives it carries.

The loopers are held in place by two permanent magnets in the arm and secured by a butterfly nut in a clamp. This clamp will hold up to 10 knives at a time.

The arm can be adjusted to grind the same distance down each looper. Normally it is recommended to grind away not more than 0·001 to 0·0015 in. off the loopers, depending, of course, upon the amount of wear encountered. This grinding should be kept to a minimum, as it will lengthen the life of the loopers. It is possible to re-grind loopers as many as ten times and still use them in the machines to good effect. On some older grinders, it is possible to grind the loopers inaccurately and grind them "hollow" so that cutting is seriously impeded as the knives do not engage across the entire face during the stroke. With the new traverse grinder this danger is said to be eliminated.



British Tufting Machinery's new precise looper grinder

Recent Work on Batching Oil Substitutes

Results of laboratory experiments using different preparations, and the effects during carding, spinning and weaving

K. K. CHATTERJEE, P. K. SAHA and P. B. SARKAR†

DUE to low natural fat and wax content and the presence of lignin, jute is somewhat harsh to the feel and needs considerable softening before it can be spun into yarn. The application of lubricants in the form of batching emulsion (oil-in-water type) is, of course, well-known but although no more than 3% oil (on the weight of air-dry jute) is necessary for processing the fibre, usually 6% oil or even more is applied in some cases. Presence of oil much in excess of 0·75% in yarns meant for carpet backing is objectionable as some oil will quickly pass on to the pile yarn, hold the dirt particles and result in fairly rapid soiling of the carpet.

A maximum of 1% oil is also advocated for fuse and other special types of yarns. Jute bags made from yarns containing a high percentage of low grade oil are reported to produce objectional odour in food grains. The present investigation was undertaken to find a suitable substitute for batching oil with few of the drawbacks of batching oil, without affecting the processing of jute in any way. Accordingly, aqueous solutions of some wetting and softening agents as well as Syton (colloidal silica) were tried either alone or in mixture in some cases.

Experimental

Mixing of mesta with jute is common in the Indian jute industry for the manufacture of jute goods and commercial samples of jute and mesta fibres—middle grade (Assam White Middle—J 6036; Plassey Daisee CN Mesta Middle—J 5846) were used for these experiments. Individual samples, 12 lb. each, were selected from a representative lot of fibres obtained by mixing and sampling thoroughly reed by reed from two bales and subsequent resampling. Each sample was allowed to stand for conditioning in the laboratory atmosphere for two days before the experiment. The sample was then sprayed with the requisite quantity of solution (the percentage of water applied being kept constant at 25% except when 10% glycerine was applied) and then passed through the softener and stacked (binned) for two days.

† *Technological Research Laboratories, Indian Central Jute Committee.*

Table 1. Glycerine/Water

Fibre	Batching oil %	Water %	Glycerine %	Card droppings % Breaker	Card droppings % Finisher	End breaks in spinning	Grist in tex	Q.R. in gm./tex	Wt. C.V. %	Remarks
Jute - J6036	6	24	—	1·5	2·2	nil	358	11·9	28	Control
,,	—	25	1	1·6	2·6	35	334	9·2	31	
,,	—	,,	2	1·5	2·5	38	358	9·6	36	
,,	—	,,	5	1·6	2·6	24	351	10·1	32	
,,	—	20	10	1·6	2·5	54	369	8·6	29	
Mesta - J5846	6	24	—	2·5	3·3	7	303	9·9	29	Control
,,	—	25	1	2·1	3·3	31	341	8·7	29	
,,	—	,,	2	2·3	3·7	40	310	8·8	29	
,,	—	,,	5	2·8	3·6	28	331	8·6	29	
,,	—	20	10	3·0	3·5	69	375	7·6	32	

The fibres were then processed and spun into yarns of nominal grist 344·5 tex (10 lb./spindle) with the same set of existing jute machinery, with the same dollops, drafts and doublings as in T.R.L. standard spins. Control experiments were carried out with 6% batching oil and 24% water in the form of batching emulsion on the air-dry weight of the fibre. All experiments were done in duplicate. Droppings were collected from both breaker and finisher cards and expressed as percentage on the weight of fibres fed to the cards. The number of spinning breaks—which gives an idea of yarn quality and spinning production—was recorded over a period of spinning ten full bobbins on the same set of five consecutive spindles selected from the spinning frame. The yarns were conditioned at 65 R.H. ± 2% and tested for grist, strength-grist ratio or Q.R. and the co-efficient of variation of the weight (Wt. C.V. %) of 2 in. yarn pieces. The results in the tables represent the mean of duplicate experiments.

Since glycerine has a softening action on the fibre, attempts were made to spin jute as well as mesta with an aqueous solution of glycerine, the quantity being sprayed so that the amounts of glycerine and water varied from 1 to 10% and 20 to 25% respectively, on the weight of fibres. Control experiments were carried out with standard batching emulsion (6% oil and 24% water on the weight of fibres). The results are set out in Table 1.

Glycerine appeared to have an adverse effect on the Q.R. and Wt. C.V. % of yarns accompanied by poorer spinning performances as shown by considerably high end breaks in spinning. The effect was more pronounced with the addition of 10% glycerine on the weight of fibres. Moreover, there was a tendency for

Table 2. Soap/Water

Fibre	Batching oil %	Water %	Soap %	Card droppings % Breaker	Card droppings % Finisher	End breaks in spinning	Grist in tex	Q.R. in gm./tex	Wt. C.V. %	Remarks
Jute - Comp. mix. J.A.R.I. sample	6	24	—	0·9	1·4	nil	348	12·4	22	Control
,,	—	25	0·5	1·1	2·1	12	314	8·4	29	
,,	—	,,	1	1·3	1·5	12	303	8·2	27	
,,	—	,,	2	1·2	1·7	10	348	8·3	27	

fibres to lap round the rollers during carding.

Soap also had some softening effect and soap solution was therefore tried for spinning jute. The amount of water added was kept at 25% and that of soap varied from 0·5 to 2% on the weight of jute. During processing the fibres appeared sticky and the lapping tendency was more pronounced than was the case with glycerine-water. The results in Table 2 show there was a considerable reduction in the Q.R. of yarns, with increased Wt. C.V. %. On the other hand, variation in the percentage of soap from 0·5 to 2% did not appear to have further adverse effect on the qualities of the yarns. A higher percentage of soap could not, however, be used due to an excessive tendency for the fibres to lap.

Lapping

When jute or mesta was spun with water alone, a higher percentage of dust resulted in loss of production. Moreover, spinning performance as well as the quality of the yarns was affected. This was more pronounced with mesta[2] than jute. It was considered that addition of a wetting agent to the water when spinning the jute fibres might have better effect and Turkey Red Oil was therefore applied from 1 to 5% on the weight of fibres, keeping the percentage of water constant at 25%. It was not possible, however, to use more than 1% Turkey Red oil due to fibres lapping round the rollers in the breaker card. Even at 1%, the fibres appeared to be sticky during processing with considerable tendency to lap.

To avoid this stickiness, Sapamine OC, reported to be a useful softening agent, was also tried. Here the fibres appeared to be quite soft but very slippery, which resulted in poor spinning performances and rather low quality ratio of yarns. Mesta yarns spun with 1% Sapamine could not even be tested. The results are given in Table 3.

To counteract the effects of Sapamine OC and Turkey Red Oil, Syton (useful in wool and cotton spinning) was tried in combination with either of these. During its use with Sapamine OC, the latter was sprayed first whereas Syton, T.R. oil and water were mixed together before application. The results, set out in Table 4 do not appear encouraging.

These particular trials showed that none of the substances could be profitably used alone or in combination as a substitute for batching oil. Although there were no marked differences in the percentage of waste (card droppings), the spinning performances and yarn strength were poor in all cases compared with the results obtained by application of standard batching emulsion (control experiments).

Attention was next given to Waxol HE, a non-ionic product[3,4] claimed to be an effective lubricant for jute processing. Different grades of commerical fibres—Tossa top (Garipur, Assam Tossa top—J 7983), White Middle (Bhuragaon, MMG, Assam Middle—J 7985), White Bottom (Cuttack White bottom—J 5847) and Mesta bottom (Daisee Mesta bottom—J 6038)—were used for the experiments. Sampling and processing were carried out as before. A dilute emulsion of Waxol HE was prepared by adding appropriate quantity of cold water to the requisite quantity of Waxol HE with constant stirring. The quantity of Waxol HE applied to the jute was varied from 0·5 to 2%, keeping the percentage of water constant at 24%. Control experiments were carried out with standard batching emulsion (6% oil and 24% water applied on the weight of fibres) as usual. Test results on the qualities of yarns, etc., given in Table 5, stand for the mean of duplicate experiments.

It may be observed that in spinning Tossa top grade jute, Waxol HE was in no way inferior to batching oil as regards the spinning performances and qualities of the yarns but with other grades of fibres, use of Waxol HE increased the end breaks in spinning. The increase in the percentage of Waxol HE (0·5 to 2%) did not appear to have any marked effect on the qualities of the yarns.

To ascertain whether there was any effect during weaving on the qualities of the yarns, fabrics (D.W. plain) were woven on handlooms from unsized warp and weft yarns of the respective samples of same grist and tested for

Table 3. Turkey Red Oil/Water; Sapamine/Water

Fibre	Batching oil %	Water %	Turkey Red Oil %	Sapamine OC %	Card droppings % Breaker	Card droppings % Finisher	End breaks in spinning	Grist in tex	Q.R. in gm./tex	Wt. C.V. %	Remarks
Jute-Comp. mix J.A.R.I. samples	6	24	—	—	0·9	1·4	nil	348	12·4	22	Control
,,	—	25	—	—	1·1	1·9	3	341	11·7	25	Control
,,	—	,,	1	—	0·9	1·8	11	338	10·1	27	
,,	—	,,	—	0·5	1·4	1·4	36	307	6·1	31	
,,	—	,,	—	1	1·2	1·8	18	303	8·0	29	
Mesta - J5846	6	24	—	—	2·5	3·3	7	303	9·9	29	Control
,,	—	25	1	—	2·5	3·0	57	320	6·5	34	
,,	—	,,	—	0·5	2·6	4·1	39	331	6·5	32	

Table 4. Syton in Combination

Fibre	Batching oil %	Water %	Syton W.20 %	Sapamine OC %	Turkey Red oil %	Card droppings % Breaker	Card droppings % Finisher	End breaks in spinning	Grist in tex	Q.R. in gm./tex	Wt. C.V. %	Remarks
Jute-comp. mix J.A.R.I. samples	6	24	—	—	—	0·9	1·4	nil	348	12·4	22	Control
,,	—	25	0·5	0·5	—	1·3	2·1	7	341	7·6	28	
,,	—	25	0·5	—	0·5	1·3	1·7	8	365	10·4	23	
,,	—	25	1·0	1·0	—	0·9	1·9	5	341	9·0	30	
,,	—	25	1·0	—	1·0	1·1	1·8	12	379	10·1	31	
Mesta - J5846	6	24	—	—	—	2·5	3·3	7	303	9·9	29	Control
,,	—	25	0·5	0·5	—	2·1	2·2	22	375	6·5	27	
,,	—	25	0·5	—	0·5	2·3	2·3	12	358	7·6	27	
,,	—	25	1·0	1·0	—	2·1	3·6	14	331	7·2	28	
,,	—	25	1·0	—	1·0	1·8	2·7	15	341	7·2	28	

Table 5. Dilute Emulsion of Waxol HE

Fibre	Waxol HE %	Water %	Batching oil %	Card droppings % Breaker	Card droppings % Finisher	End breaks in spinning	Grist in tex	Q.R. in gm./tex	Wt. C.V. %	Remarks
Tossa top — J7983	—	24	6	1·7	1·9	nil	353	13·3	22	Control
,,	0·5	24	—	1·6	2·2	nil	351	13·5	24	
,,	1·0	24	—	1·8	2·5	nil	345	13·5	25	
,,	1·5	24	—	1·8	2·3	nil	354	14·3	22	
,,	2·0	24	—	1·7	2·2	nil	338	13·7	24	
White Middle — J7985	—	24	6	1·7	2·3	4	330	10·7	25	Control
,,	0·5	24	—	1·8	2·8	20	347	9·3	30	
,,	1·0	24	—	2·1	2·4	14	341	9·2	28	
,,	1·5	24	—	2·0	3·0	12	328	9·7	27	
,,	2·0	24	—	1·7	2·8	13	342	9·9	26	
White Bottom — J5847	—	24	6	2·0	2·3	19	334	8·3	33	Control
,,	0·5	24	—	2·1	2·6	48	349	7·6	33	
,,	1·0	24	—	2·1	2·8	25	359	8·2	32	
,,	1·5	24	—	2·0	3·1	39	348	7·7	30	
,,	2·0	24	—	2·6	3·2	26	343	8·1	32	
Mesta Bottom — 6038(M)	—	24	6	3·4	4·0	35	349	7·2	33	Control
,,	0·5	24	—	2·9	4·5	86	360	6·9	29	
,,	1·0	24	—	3·2	4·5	64	360	7·5	32	
,,	1·5	24	—	3·4	5·2	69	354	7·0	34	
,,	2·0	24	—	3·1	4·8	74	356	7·2	30	

Rapisonic

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breaking strength warp- and weftways. The results appear in Table 6. It will be observed that there is practically no difference in the breaking strength of fabrics among control and Waxol-treated samples except in the case of warp strength of fabrics made from Tossa-top, which was difficult to account for. The lower breaking strength of warp yarns might be due to the yarns not being sized.

Table 6. Fabric Test Report—Wixol HE Treated Samples

Fibre	Waxol HE	Water	Batching oil	Porter	Shots	oz. per sq. yd.	Breaking strength (lb.) of strips of 4 in. width		Remarks
							Warp lb./in. width	Weft lb./in. width	
	%	%	%						
Tossa Top	—	24	6	6·0	12·5	10·4	107	103	Control
"	0·5	"	—	6·0	12·3	10·4	83	104	
"	1·0	"	—	5·8	12·4	10·1	83	103	
"	1·5	"	—	6·0	12·2	10·4	99	117	
"	2·0	"	—	5·8	12·1	10·0	87	99	
White Middle	—	"	6	5·9	11·3	9·7	66	78	Control
"	0·5	"	—	6·0	11·3	9·3	61	66	
"	1·0	"	—	5·9	11·8	9·6	64	72	
"	1·5	"	—	5·9	12·3	9·3	68	78	
"	2·0	"	—	5·9	12·1	9·8	68	85	
White Bottom	—	"	6	6·0	11·8	9·4	56	62	Control
"	0·5	"	—	6·0	10·8	9·9	47	53	
"	1·0	"	—	5·9	10·8	9·7	52	63	
"	1·5	"	—	5·9	11·5	9·4	48	58	
"	2·0	"	—	5·8	10·8	9·5	54	58	
Mesta Bottom	—	"	6	5·8	11·3	9·5	47	57	Control
"	0·5	"	—	5·8	11·5	9·5	44	59	
"	1·0	"	—	5·8	10·8	9·9	44	61	
"	1·5	"	—	5·9	11·3	9·5	41	61	
"	2·0	"	—	5·8	12·2	9·7	49	59	

Conclusions

(1) Of the various substances tried, Waxol HE appeared to be a good substitute for normal batching oil in spinning jute fibres, particularly top grades, without in any way affecting the spinning performances and the qualities of yarns which may be used as non-staining yarns for carpet backings and for purposes where the use of batching oil was objectionable.

(2) The variation in the percentage of Waxol applied (0·5 - 2%) did not appear to have any beneficial effect on top grade fibres; whereas in the case of lower grade fibres, 1% Waxol on the weight of fibres was found necessary.

(3) With the lower grade fibres such as middle and bottom grade jute fibres and Mesta bottom, the application of Waxol HE affected the spinning performances as shown by increased end breaks. Although it did not show a much higher percentage of card droppings, a considerable amount of dust was thrown out during carding compared to control experiments with batching oil.

Laboratory experiments on Waxol HE have to be confirmed by bulk trials in mills, before its use as a substitute for batching oil can be recommended, keeping also in view the cost factor.

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(3) I.C.I. Auxiliary Products Literature No. 126.

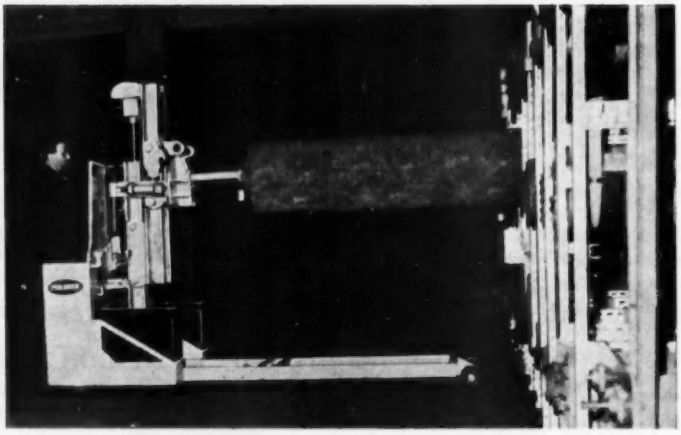
(4) I.C.I. Dyehouse No. 563.

New Vehicle can Handle Wide Carpets

SPECIALLY designed for handling up to 15 ft. long rolls of carpet, linoleum, paper, etc., a new, compact, battery-operated truck introduced by A. Hirst and Sons Ltd., Crescent Works, Meadow Lane, Dewsbury, is sturdily built of all steel welded construction. Known as the "Forager Boom Truck" it has a capacity of 600 lb. at 7 ft. 6 in. centres and the standard model is fitted with a 12 ft. boom for handling the 15 ft. long rolls. Its outstanding feature is a 7 ft. long outrigger which enable this comparatively small truck to lift its full capacity without overbalancing. Both boom and outrigger feet are tailor-made to suit individual carpet requirements.

The hydraulic lifting gear is operated by a separate pump motor unit and "spring off to centre" control valves. Driving controls consist of forward and reverse switch, speed control handle and steering handle. The speed control handle give three forward and three reverse speeds and also operates the brake when released. Speed is approximately 3 m.p.h. laden and unladen. All wheels are rubber tyres and have roller bearing hubs.

The truck has a 24 volt d.c. drive motor which is powered by a 12-cell Kathanode traction battery of 220 Ah. capacity supplied by D.P. Battery Co. Ltd., Bakewell. The truck measures 3 ft. 2 in. wide × 7 ft. high for 9 ft. 6 in. lift × 10 ft. 5 in. long over outrigger feet.



The boom truck in operation, removing a 15 ft. roll of carpet from a rack

New Publication

MODERN PRINTERS' YEAR BOOK AND DIRECTORY OF SUPPLIERS. Rendles (Torquay) Ltd., 15-16 George Street, Torquay (price 6*s*.).

Several hundred alterations have been found necessary in the preparation of the 1961 edition to ensure that the directory of suppliers should be thoroughly up-to-date. Similarly, the branded papers and type specimens sections have been revised and enlarged. Although the greater part of the information contained in this handy year book is of interest primarily to those in the printing trade, much of it will also be extremely useful to print-buyers and the editors of house journals.

Stable Nylon Crêpe Fabrics Containing E P 1 False-Twist Crimped Weft Yarns*

DIMENSIONALLY stable crêpe effects can now be achieved in plain weave nylon fabrics, using continuous filament for warp and false-twist crimped yarn for weft. The fabrics are characterised by resiliency, a full, warm handle, satisfactory opacity and all the "ease-of-care" properties associated with nylon.

Trials have shown that dimensional changes after immersion in boiling water are within the satisfactory limit of 1% (width and length). There is little tendency to crease on washing, and the appearance ratings for most of the samples in the series under test were "non-iron". Hand washing followed by drip drying caused the least creasing; machine washing followed by either drip drying or tumbler drying can also be recommended.

Two weaving constructions are described in this report: the first is eminently suitable for dress and blouse fabrics, and the second yields a lighter fabric suggested for lingerie.

The crêpe effect, which is inherent in the fabric construction, is specifically determined by (*a*) developing bulk in the weft yarn; (*b*) pre-crêpe calendering, which offers the means of varying the crêpe configuration and ensures uniformity throughout the piece; and (*c*) varying the fabric width at heat setting.

Below are offered some suggestions for yarn pirning, weaving and fabric finishing. All the constructions and finishing procedures discussed in this report refer to fabrics woven with weft yarns crimped by British Nylon Spinners' EP 1 false-twist process. Further work on evaluating other nylon crimped yarns is meanwhile proceeding.

Pirn Winding

Pirns with satisfactory stability for weaving can be produced with lower tensions than would be employed for normal filament yarns. A maximum of 15–20 grams is suggested for 2/70/34 yarns. The prins should be in good condition and free from any roughness to avoid yarn snagging and plucking.

Weaving

Crimped weft yarns are very prone to snagging on any surface which they may touch in the loom and the following points are, therefore, important:

(1) The yarn should be well controlled in the shuttle by means of adequate furring, but yarn withdrawal tensions should be kept to a minimum, commensurate with freedom from weft looping, in order to avoid shuttle tension barré.

(2) Shuttles, shuttle boxes and race board covering should be kept scrupulously clean and smooth to prevent yarn snagging and the formation of slubs.

(3) Sequential pirning and weaving may be beneficial in avoiding pirn junctions due to slight variations in yarn processing.

The following fabric construction in loom has given satisfactory resistance to thread slippage in blouse and dress fabrics:

Warp ..	45/15/7½ Z semi-dull ("Hyalcol"† sized)
Weft ..	2/70/34 EP1 false twist crimped
Ends/inch (in reed)	96
Picks/inch (in loom)	62
Weave	Plain

The finished construction will vary according to the method of finishing employed and to the degree of crêpe development permitted. As an example, a fairly full crêpon finish could be expected to have 114 ends and 68 picks per inch from the above loom construction.

Crêpe fabrics light in weight, and more suitable for lingerie, may be produced from finer denier EP 1 weft yarns. For example, 1/70/34 and 2/40/13 yarns at 82 picks/inch in loom have been successfully employed in combination with the above warp at the same endage.

Finishing

The critical step in finishing is the development of bulk in the weft yarn. This distorts the fabric structure so as to produce a crêpe pattern. Trials have shown that (*a*) the fabric must be agitated during scour bulking; and (*b*) the fabric must be entered into the scour bath at a low temperature. Failure in either of these requirements will lead to partial or complete stabilisation of the weft yarn and poor development of yarn bulk.

Pre-crêpe Calendering.—The "two-way" crêpe effect brought about by the development of weft yarn bulk, can be modified by pre-crêpe calendering. This gives the opportunity of selecting many possible crêpe configurations; it also ensures uniformity, and reduces the risk of rope-marking during winch bulking treatments.

Calendering the grey cloth at a temperature of the order 95°–105°C. (203°–221°F.) before scour bulking has a slight stabilising effect on the false-twist crimped yarn. Within this range, the selected calender temperature must be constant.

Bulking

Crêping beck.—Scour bulking can be done successfully in a crêping beck with the fabric at open width. The fabric is prepared in hank form and either strung from the selvedge or placed over poles in the beck. Treatment should start at a temperature no higher than 30°C. (86°F.), and the temperature raised *slowly* to 40°–50°C. (104°–122°F.) depending upon the amount of fabric agitation and degree of crêpe required. This temperature is maintained for 15 min. and provided sufficient agitation is ensured there should be no need to use a higher temperature.

The use of a compressed air supply to the beck in conjunction with a cloth rocking motion has been found to give adequate agitation. If these are not available, the fabric should be moved by hand. Normal scouring assistants are added to the bath.

After development of the crêpe pattern, the fabric is rinsed, either in the beck or in a winch machine. If a winch is used, the temperature should not rise above 40°C. (104°F.). The fabric is then lightly hydro-extracted, and dried relaxed in preparation for heat setting. Relaxed drying, which may be done by any of the conventional methods, will bring about additional width shrinkage. Tension during drying will destroy some of the crêpe effect.

Winch.—An alternative method of developing yarn bulk is to use a winch machine. This may prove more convenient for some finishers, and ensures considerable movement of the fabric during the scour bulking process; there is, however, a danger of rope-marking, which can be prevented by first wetting out at open width to pre-form the crêpe configuration. This is done by preparing the fabric in hank form and entering into the crêping beck at a temperature no higher than 30°C. (86°F.). Treatment for 15–20 min. at this temperature with agitation will pre-form the crêpe configuration.

The fabric is transferred from the beck to the winch machine and given a conventional scour, which also develops the crêpe. To avoid rope-marking, the temperature should be raised slowly to 40°–50°C. (104°–122°F.), which is adequate, provided that the temperature of pre-treatment in the beck has been controlled. The crêpe fabric is rinsed clean and dried in preparation for heat setting.

Heat Setting.—Heat setting is a necessary part of the finishing sequence, and should be done on an overfeed pin stenter. It confers excellent dimensional stability and "minimum iron" properties. In addition, the degree of crêpe effect can be controlled by varying the set width of the fabric. A wide range of effects can be obtained,

Good stability depends on correct setting conditions. The stenter temperature should be within 200°–220°C. (392°–428°F.) with exposure times of 15–30 seconds.

Dyeing

After heat setting, the crêpe fabrics can be bleached and finished white, or dyed, or prepared for printing. The fabric should be treated in relaxed form, and processes which tend to flatten the crêpe should be avoided. The use of a star-frame is ideal. Trials suggest that the fabric may also be winch processed after setting without rope-marking or modification of the crêpe pattern.

Finishing agents may be used to modify handle; if softening agents are used, preliminary trials should be done on the fabric to ensure adequate resistance to seam slippage. The fabric is finally dried to dimensions on a pin stenter.

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* *Advance Report No. 42, issued by British Nylon Spinners Ltd.*

† *A trade name of Allied Colloids Ltd.*

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Reviews

THE BUSINESS OF MANAGEMENT. Roger Falk. Penguin Books, Harmondsworth, Middlesex (price 3*s.* 6*d.*).

Currently serving as Director-General of the British Export Trade Research Organisation and having had wide and varied experience of management problems at home and overseas, Mr. Falk is obviously well qualified to help "those who feel that management is a subject worth thinking about." Equally obviously, his own thinking has been profoundly influenced by the addresses delivered at the jubilee conference of the Harvard Business School at which the topics ranged from national security to morality in business. Current changes in ideas and practices throughout the world call for adaptability and receptiveness on the part of management in both the general and sales fields. Throughout the book the author stresses the vital importance of human relations, for even though human nature does not greatly change, vastly different situations are constantly arising in the field of human achievement. As Mr. Falk writes of these new challenges to management in the spheres of business methods, selection, training in a refreshingly incisive way and illustrates his conclusions with several case histories, both of success and failure, this handy little paperback will greatly help the management trainee and the experienced executive will not find it unprofitable study.

* * *

SKINNER'S WOOL TRADE DIRECTORY OF THE WORLD 1961-62. Thomas Skinner and Co. (Publishers) Ltd., 91 Kirkgate, Bradford (price £4).

The publishers' declared aim is to make this directory as complete as possible. Constant revision has certainly resulted in a work of reference which experience has proved to be both comprehensive and reliable for those anxious to trace information relating to manufacturers, merchants, exporters, brokers, converters, dyers and finishers and also the sources of supply of raw materials and services essential to the wool industry. The user's task is simplified by good classification and indexing.

* * *

MANUAL OF THE TEXTILE INDUSTRY OF CANADA 1961. Canadian Textile Journal Publishing Co. Ltd., 223 Victoria Avenue, Westmount, Montreal 6.

The principal contents of this manual are to be found in the directory sections which cover technological and trade associations, a list of textile chemical trade names, a carefully classified buyers' guide and an alphabetical list of textile mills which shows the capital, principal executives, products, equipment, labour force and supplies bought for each mill. This is followed by a geographical index to mills. Several editorial articles make interesting reading and, for the statistician, annotated tables give necessary figures for all sections of the Canadian textile market.

NATIONAL DIRECTORY OF NIGERIA, TRADES AND PROFESSIONAL, 1960 - 1961. Unimex (London) Ltd., 25 Bloomsbury Way, London, W.C.1. (price 52*s.* 6*d.*)

Despite formidable competition by foreign countries Nigeria remains an important market for British products including textiles. The appearance of the second edition of the National Directory is, therefore, an event of importance to traders in bulk countries as inadequate directory coverage is frequently an obstacle to effective trading relations.

The directory can be of great service in many ways, principally, of course, by reason of its alphabetical and classified lists of trades and professions. It provides, for example, much information on transport and hotel facilities, health regulations and location of industries needed by the business visitor to Nigeria, together with statistical tables of Nigeria's import and export trade.

* * *

APPAREL MANUFACTURING ANALYSIS. Solinger, Jacob. Interscience Publishers Ltd., 88 - 90 Chancery Lane, London, W.C.2. (price £8.).

At first glance the price of this book might be deemed unduly high, but closer examination will soon convince potential purchasers of its outstanding value. There are, of course, considerable differences between the apparel industries of the U.S.A. and Britain. They share, however, many problems in common and in the course of its 800 pages, this well-produced book undoubtedly shows how some of these may be solved. The objects of the book are to present a means for establishing and measuring factors which determine quality in apparel items and to indicate basic procedures for attaining the required quality at minimal cost, using current methods to demonstrate those principles of apparel manufacture which always hold true.

Mr. Solinger also aims to aid fashion leaders in the development of ideas which will benefit this seasonal and highly mechanized industry. Briefly stated, the plan of the book is to analyse the problem; to develop principles and methods for its solution and to show how these principles and methods may be best applied.

The greater part of the work is devoted to practical apparel productions with additional chapters on packaging, plant layout, production control, sales engineering, organisation and personnel, cost control and time and motion study. All these are analysed in great detail and classified by numerous excellent illustrations and charts. A classified bibliography contains references to books and periodicals for those who wish to pursue their studies further and keep abreast of current developments. A remarkably fine book by a leading management consultant and specialist in the problems of one of the U.S.A.'s top ten industries.

SURFACE ACTIVITY. By J. L. Moilliet, B. Collie and W. Black. Second edition. Spon, London; 1961. Pp. 518, price 75*s.*

The second edition has been completely revised and extended in view of the progress made in the study of the theory of surface activity and the wider application of surface-active agents. It covers the physical chemistry, chemical constitution and technical application of surface-active agents. The authors discuss in detail the fundamental phenomena in detergent processes, the redeposition of solid or liquid dirt on textiles, public health aspects of the use of synthetic detergents and the application of such products in pigment-pad dyeing and other textile processes. The last chapter deals with the chemical constitution of surface-active agents and the relationship between chemical constitution and surface activity.

The book includes a comprehensive bibliography of literature references and patents, and it is invaluable to all who take a scientific interest in the practical application of surface-active products. It well merits a place in every technical library.

B.S.

* * *

MAINTENANCE OF ELECTRIC MOTOR CONTROL GEAR. British Standards Institution, British Standards House, 2 Park Street, London, W.1. (price 6*s.*).

A new code of practice (C.P.1011) on the maintenance of electric motor control gear should prove of great value to all concerned with the maintenance and management of electrically powered industrial plants. The code provides guidance on those matters which experience has shown to be of major importance in keeping electric motor control gear in efficient working condition. The various statutory regulations with which electrical installations may have to comply are indicated, together with such important general matters as inspection, observance of manufacturers' instructions, and the analysis of faults.

An important section deals with the safety of personnel operating the installation, and emphasises such important precautions as: isolation before maintenance work is carried out; the use of voltage indicators; special precautions in dealing with oil-immersed equipment; and the maintenance of earthing connections. Notes are included on first-aid and fire extinguishing equipment. The main section of the code sets out general principles of maintenance which are applicable to most types of equipment, followed by detailed recommendations for various types of control gear such as contactors, drum controllers, overload and time-delay devices, liquid starters and controllers, push button and similar auxiliary devices, isolators and composite units of switches and fuses. There is a useful list of special equipment (other than tools normally used by the electrician) which may be needed for carrying out the recommendations of the code.

* * *

POLYETHYLENE GLYCOLS. A new technical brochure evaluating seven types of polyethylene glycol is now available from Allied Chemical International, 40 Rector Street, New York 6, N.Y., U.S.A. The brochure outlines specific applications in cosmetics, pharmaceuticals, soaps, detergents, rubber, textiles, plastics and agriculture among other industries. In addition, specifications, shipping and handling information are given.

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Textile Trade and Prospects

Uncertain Atmosphere Affects Trade

Recent forecasts of the world cotton situation indicate that total production may fall short of the previous season's record despite the acreage expansion reported in most cotton growing countries. Although the U.S. Department of Agriculture recently increased its estimate of the current crop, this must have been affected by the later hurricane damage. The total world acreage has now been estimated at approximately 62·5 million bales and most of the increase of 1·5 million acres was outside the U.S. The latest estimate of world production (excluding China, U.S.S.R. and Eastern Europe) is 32·8 million bales against 33·2 million in the 1960-61 season.

Following acceptance by the Hong Kong mill owners of the U.K. Governments proposals covering cotton textile exports to this country to the end of 1962, changes in the arrangements with India and Pakistan are to be introduced. These involve a supplementary quota for India of 11 million sq. yds. for 1961 and 2·5 million sq. yds for Pakistan. The Indian ceiling figures for 1962 will be increased from 175 to 195 million sq. yds. and the Pakistan ceiling from 38 to 42·4 million. Both will receive their proportionate share of any supplementary quotas which may become available in 1962.

The yarn and cloth market has been badly affected with most buyers reluctant to commit themselves any further than immediate needs. Political and economic uncertainties make it extremely difficult to negotiate contracts of any size despite the stability of raw material supply and prices. The low level of current demand is reflected by the short-time working introduced by some firms—mainly in the spinning sections. Demand for most yarns has been spasmodic with fine combed and medium qualities very poorly supported. Coarse numbers attracted most of the restricted attention and some small orders were booked for medium ring beams. Hosiery specialities are now moving slowly and only in some blended specialities could the market be described as healthy. Certain fancy and novelty types have been in reasonable request. In general, the off-take is far from satisfactory and one cannot help wondering at times if the present system of buying and selling has not largely outlived its usefulness. Modern production methods are only partly effective if they are not supported by equally modern selling techniques.

Details of the recent arrangements with Hong Kong, India and Pakistan gave little consolation to Lancashire manufacturers and many voiced their resentment on realising that the import ceilings were far from being settled. Available business in cloth has been poor and what turnover has been negotiated has been on home trade account. In dress-goods, a few interesting lines were booked in well designed dobby and jacquard qualities in both cotton and spun rayon. A little interest was observed in stylish machine and screen printed cloths in new shades and clever colour combinations. Cotton, rayon and other man-made fibre shirtings have lacked support but it is hoped that the pipe-line in these cloths will soon become easier. An early resumption in general buying interest would be more than welcome at the moment. In furnishing fabrics a few good lines were put through but, overall, the demand was meagre. Although order books are not healthy the resulting earlier delivery dates do nothing to stimulate activity.

A quick return to normal buying could momentarily create enormous difficulties in view of the unbalanced production and selling situation. Clearing centres report very irregular business and stock tends to slowly rise. The apathy has also had adverse effects on industrial textiles and business has been virtually at a standstill. Home trade demand for household textiles has been a little better but lacks both sparkle and volume. Small orders continue to be booked in sheetings and cotton and cotton/mixture blankets. Quilts and table cloths sell slow and a similar state of affairs can be seen in terry cloths and towellings. Apart from small orders for one or two overseas outlets, export business remains pathetic.

Wool Market—Yarn and Cloth

Forthcoming Australian clip promises to be superior in quality to the wools marketed in 1960-61, states the National Bank of Australasia in reviewing the outlook for the current season. Generally, fleeces are expected to be heavier, and offerings should comprise better-grown and sounder-stapled wools. Most districts report that widespread autumn and early winter rains have produced much more favourable conditions than at this time last year. Sheep are stated to be in excellent condition in most of Victoria and South Australia, in the southern districts and north-west plains of New South Wales, and in most areas of Western Australia. The review says that because of the relatively low level of wool stocks in the main consuming countries, competition should be keen and the market firm for at least the early part of the season. Demand for wool is expected to increase as a result of proposed higher defence expenditures by the United States and Russia.

British wool textile production increased in most sections in July, according to the Wool Industry Bureau of Statistics. Compared with a year earlier, the rate of wool consumption was 5% higher, wool top and worsted yarn production rose about 10% and wool fabric deliveries were 1% up. July output figures were:—Wool consumption, 40.1 million lb. (clean weight); top production, 28·6 million lb.; tops drawn, 17·6 million lb.; worsted yarns delivered, 19·8 million lb.; woven fabrics delivered, 29·5 million sq. yds.; blankets delivered, 2·2 million sq. yds.

American imports of finer grade apparel wool rose sharply in the first six months of 1961 over the same period last year, reports the Wool Bureau, New York. Imports of merino wool rose by 8% and fine crossbreds by 16%. As a result of the shift from coarser grades of wool, imports of grades above 56's accounted for 78% of this year's apparel wool imports, as compared with 70% in 1960. Total imports of dutiable apparel wools increased by 2%. Although imports of duty-free carpet wools dropped 4%, New Zealand, India, Pakistan and the U.K.—major suppliers of carpet wools to the U.S.—increased their shipments.

There was an almost general improvement in prices at the first Bradford sale of the British wool marketing season, when the Committee of London Wool Brokers—acting for the British Wool Marketing Board—offered 3·9 million lb. of domestic fleece at auction. Compared with the Leicester sale of July 26, picks were 2½% dearer and extreme prices were realised for tegs. Supers were up to 5% dearer, fine topmaking wools were fully firm, half-breds advanced par to 2½%, and Massams were 2½-5% dearer. Lincolns, lustre wools and Welsh descriptions remained firm and Radnors advanced 2½%.

Britain's wool textile industry is contesting an application by the Australian industry for substantial increases in Australian wool textile import duties. Written submissions have been already made for wool yarns and cloth and R. E. Masters, assistant secretary of the National Wool Textile Export Corporation, flew to Australia to give evidence before the Australian Tariff Board at public hearing in Sydney. The British case to the Tariff Board contends that any difficulties of the Australian wool textile industry do not result from fabric imports from Britain. Attention is drawn to the advantages of locally available raw material enjoyed by Australian mills over outside suppliers, and warning is given that, if the Commonwealth Government imposes higher duties on wool textiles, the effect can only be detrimental to the interests of raw wool, which are vital to the country's economy. The written case has been submitted by the Wool Textile Delegation, the National Wool Textile Export Corporation and chambers of commerce.

Linen Trade Review

Demand from home and overseas markets is normally spread over the year with peak periods in spring and autumn but the pattern in recent years has displayed an increasing measure of uniformity with a progressive decline in overall volume. Some improvement has been seen in the last few weeks and this has resulted in a slight increase in the number of spindles and looms in production but the total is still substantially below capacity.

A perfect team

For successful racing of a motorcycle combination teamwork is essential. Both rider and passenger must work in unison—at high speeds a wrong movement by either could put them out of the running.

Team your electric motor with a Renold chain and reap the benefit of the only drive with 98½% proved efficiency. Compact and non-slip, a Renold chain drive preserves a definite ratio and relationship between the driven and driving shafts and maintains its efficiency throughout its speed range. Unaffected by atmospheric conditions, there is no initial tension—no pull on shaft bearings—and it is available for transmitting the full power of the electric motor immediately on starting up.

RENOLD chains go with electric motors

RENOLD **RENOLD CHAINS LIMITED · MANCHESTER**

This condition is not peculiar to the linen industry. In the cotton trade some mills are now working short time but the fundamental causes are different. While British cotton manufacturers have been faced with competition of cheap imports from low labour cost sources in home and overseas markets, as well of expanding domestic manufacture in many of the latter, the linen industry is not being swamped by competition of this nature. Instead, it is being gradually priced out of traditional markets by cotton, and to a lesser extent, man-made fibre textiles.

This competition has been responsible for contraction of flax spinning capacity in British mills by over 50%, and looms by a lesser total in the last decade. The considerable outlay—totalling over £25 million—since the end of the war has contributed little towards a solution of the problem, if it has not aggravated it by increasing the production potential of the equipment installed, without reducing materially the gap in manufacturing cost, the root source of the trouble.

An appraisal of the results of measures adopted by the industry to solve the problem of post-war competition is long overdue. If this had been carried out ten years ago, by which time post-war shortages in the consumer market were eliminated and the pattern of normal demand had become established, much unprofitable capital outlay on re-equipment could have been avoided and an early approach made to the problem for which a solution must yet be found if further contraction of productive capacity is to be avoided. Even at this late date diversion of some of the considerable Government subsidised outlay from publicity to market research would undoubtedly ensure more profitable long term results.

Scutch mills are gradually stepping-up output and the volume of deliveries approaches a level which should establish a price basis for the 1961 crop, provided it is not disrupted by large scale exports by the U.S.S.R. Reports from Belgium and Holland emphasise the quality and yield of straw, which should be reflected in fibre outturn. Deliveries to date cannot be taken as representative because scutchers tend to work-off much of their low grade straw at the beginning of the season when supplies are low. Current quotations are on the basis of £165 per ton (Courtai "A"); £170 ("B"); £175 ("C"); c.i.f., U.K.

Export figures for linen manufacturers relating to the six months ending June 30, 1961, show an overall decline of 14% in value compared with the corresponding period of 1960. When the figures for dry and wet spun products are separated the decline in the latter section is considerably above the overall figure as exports of linen canvas and other dry spun products were substantially higher in 1961. A breakdown of wet spun exports shows a progressive decline in all established lines fundamental to the economic wellbeing of this section. Linen handkerchiefs, formerly an important export and the mainstay of the trade's fine section, have declined to below 40% of their pre-war total. This was always a competitive line, and the cause of the drastic decline is apparent when comparison is made of the average value per doz. This shows an increase of approximately 375% in the period.

Jute: Raw Materials, Yarns and Cloths

After a steady decline in raw jute prices values are now advancing. Whether this will prove of a temporary nature it is difficult to say as imports of loose jute from up-country in East Pakistan are declining and quality shows no improvement. During the first two months of the season prices fell steadily despite the fact that most countries were in the market for supplies of early shipment material. Some grades were reduced by over £30 per ton during the two months and E.P.C. values of all grades were reduced on many occasions.

It has already been announced that the minimum price for Export Firsts would be £100 c.i.f. and when this statement was made the E.P.C. value of this grade was £119 10s. However, a further statement was made that no further reduction could be expected in the E.P.C. rates in the near future, although they were still well above the announced minimum level. This caused a certain amount of apprehension to sellers as most, were making offers at under E.P.C. levels for forward shipment, expected a further reduction to take place before time of shipment. As a result, "bear" sales already made had to be covered and with this additional business being placed in Pakistan when imports of loose jute were declining, a much firmer market came into being.

The most noticeable feature in the raw jute market during the past month has been the almost complete lack of offers of higher grades of white jute. No offers have been made of crack Hearts this season and few shippers have been in a position to sell Mill Firsts. Offers of Mill Lightnings have never been freely made and most 'sellers withdrew from the market where this grade is concerned. Hopes that the quality of the crop would show some improvement have not materialised.

In the case of dark jute, reports regarding the out-turn of the crop are satisfactory and offers are being quite freely made for Oct./Nov. shipment. So far as Dundee is concerned, not a great deal of buying has taken place as spinners were hoping prices would decline further. Offers were made at £127 for Mill Lightnings, £105 for Mill Hearts and £88 for grade Hearts, c.i.f. U.K., for September shipment and £125, £103 and £87 October. Dark jute was at £125 for grade Tossa-2/3, £116 for grade Tossa-4 and £104 10s. for Continental Tossa-2/3 for October shipment. At one point cuttings were available at £46 for N.C. but these advanced by £6 per ton to £52.

With a large out-turn of jute expected from both the Pakistani and Indian crops there is no reason why prices should not eventually return to a downward trend. At present, values appear firmed by artificial means and if this is the case, it cannot be maintained indefinitely. However, it has upset spinners' buying programme and caused some anxiety in the trade. So far the present crop has produced a surplus of the lower grades which has resulted in price margins between the various qualities becoming greater. The official difference in price between Mill Lightnings and Mill Hearts is £12 per ton but in actual offers this has increased to over £20.

The Calcutta goods market has followed the trend of raw jute prices fairly closely and values commenced to rise about the beginning of September. A steady demand from most consuming countries prevented stocks accumulating in spinners' hands. Quotations are at 75/3 for 10 oz. 40 in., and at 57/9 for 7½ oz. per 100 yds. f.o.b. Calcutta for September shipment, at 73/- and 55/6 October, at 71/- and 54/- Nov./Dec. and at 68/9 and 52/- Jan./Mar. B twills were at 202/9, 198/3, 193/9 and 187/- for the respective shipment periods.

With raw jute prices falling, little interest was shown in yarns and cloth at Dundee. Consumers restricted purchases to essential requirements a short distance ahead. When a firmer tone came into the market, much more interest and a substantial business was placed for delivery a fair distance ahead.

Silk and Man-Made Fibres

The all-too-familiar pattern of shrinking order books and foreign competition is again worrying many Lancashire spinners and manufacturers. A few spinners are reasonably well placed with current orders but others have already resorted to short-time work to prevent excess stocks. The off-take by the warp knitting sections has helped considerably to ward off some depression and nylon or "Terylene" yarns and blends are in steady demand.

Business in a wide variety of dress cloths has been noticeably slow but furnishing fabrics of various types received slightly more support. Cotton/"Terylene" blends remain popular in the shirting trade, although here again some ground has undoubtedly been lost to warp-knit specialities for this class of goods. Acetate linings are in steady request in both Lancashire and Yorkshire with fancy woven types in good demand.

Wool/"Terylene" suitings in a wide range of fancy weaves, plain and striped variations continue to sell well, also wool/rayon blends for ladies' and men's cloths.

In Leek and district activity is spasmodic, buyers usually being reluctant to commit themselves too far ahead with thread orders. One or two well-known types remain in good demand but much more business in all types would be welcome. Some manufacturers are gloomy about the prospects in a Common Market because of the present cost of their raw materials.

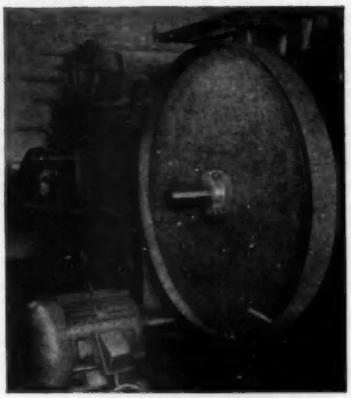
Knitwear manufacturers report a reasonable volume of trade but it is definitely not up to the output in recent months. Wool is still very much in favour but the production of garments of all synthetic yarns has reached remarkable figures.

Midland manufacturers complain of fierce overseas competition sources but so far the industry is well employed. Warp-knit fabrics account for a fair proportion but knitted outerwear such as cardigans, etc. is also well supported mainly for the home market. In the total turnover the synthetics maintain a firm hold either alone or in blended yarns.

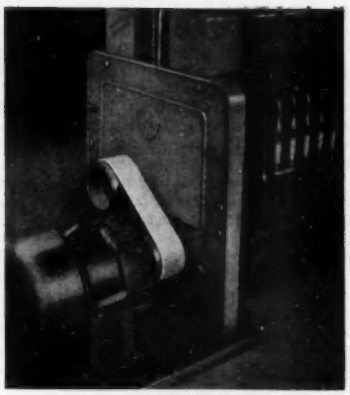
Demand for seamfree hose is still brisk in the Hinckley area and more plant has been installed to cope with this. What would happen if demand switched suddenly to full-fashioned nylons again is anyone's guess. At the moment the call for full-fashioned still accounts for a fair percentage, chiefly in the better-class range.

There's not much....

MAIN DRIVE

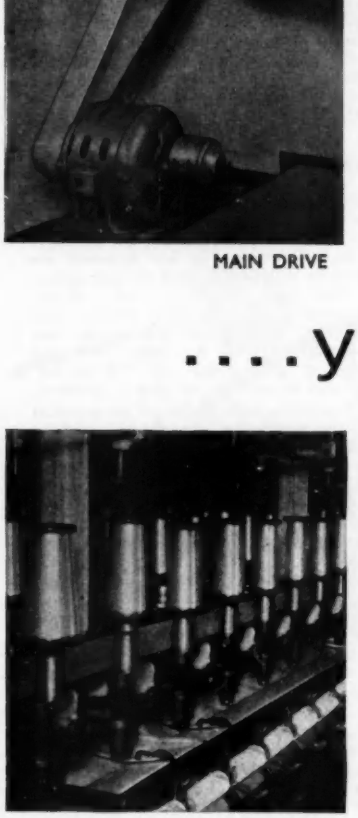


CARDING ENGINE DRIVE

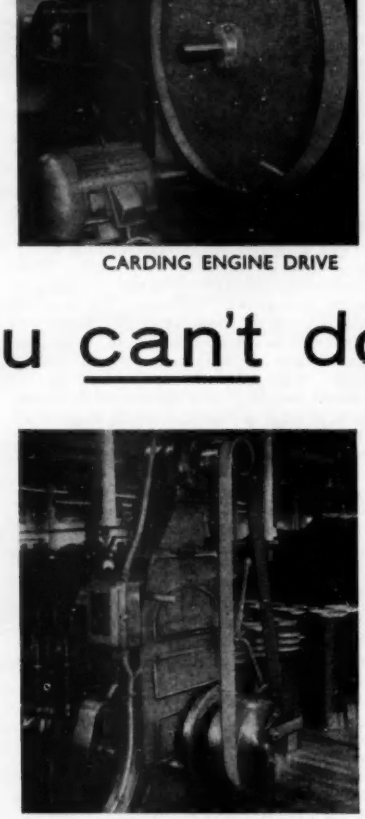


RING FRAME DRIVE

....you can't do with....



UPTWISTER DRIVE



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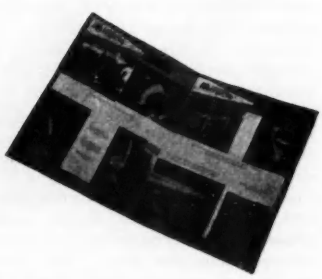
This booklet has been specially produced for the Textile industry and contains over 40 photographs of MIRACLO applications on textile machinery. It will prove the unquestioned superiority of MIRACLO over other types of flat belts and V-Drives



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Notes and News

Testing and "Courtelle"

As most manufacturers know the Courtaulds care labelling system in no way replaces the "Courtelle" labelling scheme, whereby Courtelle fabrics are tested to ensure that garments made from them will have all the easy-care, easy-wear qualities for which this fibre has become so much sought after. The testing of "Courtelle" fabrics, both woven and knitted, still continues, and the Courtelle label is a pledge that any garment carrying it, if cared for in the way indicated, will retain its good looks throughout its wash and wear life.

* * *

Australia's Wool Research

Australia's government has allocated a record sum of nearly £A3 million for sheep and wool research during the next 12 months, reports Radio Australia News. This is almost 50% more than last year. The money comes from the Wool Research Trust Fund, to which the Australian government contributes on the basis of 4*s.* per bale and the wool industry 2*s.* per bale. Of this year's allocation Australia's C.S.I.R.O. (Commonwealth Scientific and Industrial Research Organisation) will receive about £A2,750,000.

* * *

U.K. Wool Price

For the second successive season, Britain's wool clip commanded at auction the highest average price of any wool clip in the world during the 1960-61 season, claims the annual report of the British Wool Marketing Board. The report states that, although there was a general decline in world wool prices last year, coarse and medium wools were less severely affected than the finer types. As a result, by April 1961, British Wool was averaging nearly four pence per lb. more than Australian, which is mostly of the fine merino type. Exports of British fleece wool reached a new record level last year, says the Board. More than 60% of wool sold by the Board was subsequently exported, earning £10·6 millions in foreign currency.

* * *

B.O.A.C. Boost for Textile Exports

New, low cargo rates are now available (subject to Government approval) to the textile export industry on B.O.A.C. flights from London to Montreal and New York.

The rates from London, Manchester and Glasgow—5*s.* 2*d.* per kilo for consignments of more than 45 kilos, dropping to 4*s.* 9*d.* for consignments of more than 500 kilos—will cover natural and synthetic yarn, thread and fibres, bales, bolts or pieces of cloth, drawnwork, needlework, embroideries, tulle and lace, hat bodies and handkerchiefs. In addition there will be a new rate of 4*s.* 5*d.* a kilo for consignments of 2,500 kilos and over for cloth exclusively in bolts, bales or pieces not further processed or manufactured.

Courtaulds Exhibition

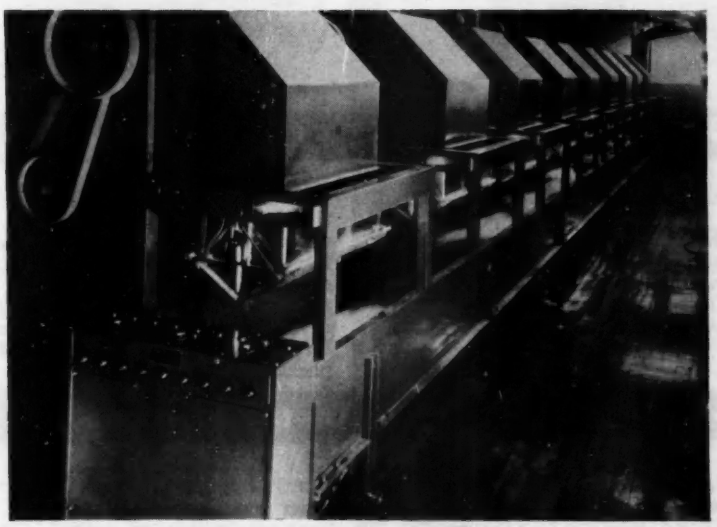
The Courtaulds Exhibition showing the latest trends and developments in the world of "Courtelle" will be held at Celenese House, Hanover Square, London, W.1., October 20th to 25th. There will be special displays featuring knitwear, children's wear, men's wear and household textiles and there will also be an exhibition of fabrics showing the latest developments in "Courtelle". Two fashion shows will be held daily at 11.30 a.m. and 3.15 p.m. and many of the newest fashion developments from the Continent will also be included.

New Automatic Weighing Systems

IT is now possible to lower the grade of cotton used in an all-over blend and achieve the same end results. Immediate results were seen, with a higher break factor and less ends down when using the automatic Blending unit. The automatic weighing unit will definitely help manufacturing performance when used in blending by micronaire, staple length and other cotton characteristics. These are typical of recent statements reported to have been made by mill officials about the automatic weighing system, an integral part of the Hunt fibre meter blending equipment. The system is claimed to maintain blending accuracy within limits of ±1% maximum variation. It automates the blending of cottons, wool and man-made fibres and manual labour is not required, other than for loading the hoppers, and for ordinary cleaning and maintenance.

The new Hunter automatic belt blending conveyor is so designed that it can be used with existing feeders to accomplish the accurate weighing of fibres. Each unit includes the necessary parts so that conversion can be easily accomplished on other makes of opening room feed hopper. The company point out that it is not necessary to install a complete fibre meter system in order to gain the many advantages of Hunter's automatic belt blending conveyor.

Where the installation of a completely new Hunter fibre meter system is called for, the operation is fast and precise. The fibres are fed into the appropriate receiving hoppers from the stock hoppers. Here they are efficiently opened by a statically and dynamically balanced comb, in a totally enclosed area designed to eliminate dust and fly. An exact predetermined weight is automatically and simultaneously dropped by each fibre meter onto the horizontal conveyor, which indexes the full length of a fibre meter weigh pan between each drop. The sandwiched layers are carried to a single beater or inclined conveyor-blender, thence to a cleaning unit, and finally through a condenser, a distributor, and on to the picker. The entire line is centrally controlled. If one of the units fails to operate, the entire line is stopped automatically, thus avoiding improper blending. Green running lights and red discharge and trouble lights keep the operator aware of the operating status of each unit.



Automatic belt blending conveyor showing control panel, conveyor, weigh pan assembly, transition piece containing overflow door

"Cellophane" multi-packs

display-value

Full six-sided visibility comes with a "Cellophane" film multi-pack. The retailer frequently puts these sparkling film show-cases straight onto his shelves, giving your products valuable display space at point-of-purchase.

protection

"Cellophane" film multi-packs give full protection against dirt, dust and damp, and, by clearly showing fragile contents, promote more careful handling. Particularly suitable for multi-packaging is MXXT/A "Cellophane" — gauge for gauge the most moistureproof packaging film in the world.

economy

Materials-cost alone is frequently less. And you save because no printing, labelling or adhesives are necessary. "Cellophane" film multi-packs are easily made up by hand or machine.

retailer-goodwill

Transparent multi-packs mean easier stock-control through instant recognition of nature, size and quantity of contents. "Cellophane" film is cleaner to handle and easier to dispose of too.

Let us tell you how multi-packaging in "Cellophane" film can improve your business. We shall be glad to make up specimen packs with your products and provide full details of costs and wrapping equipment—entirely without obligation, of course.

Get in touch with us today.

BRITISH CELLOPHANE LIMITED

Henrietta House, 9 Henrietta Place, London, W.1. Tel. MUSeum 8311

"Cellophane" is the registered trade mark of British Cellophane Limited and denotes the brand of cellulose film manufactured by them.

"Ulstron" Plant Starts up at Wilton

I.C.I. have started production of "Ulstron"—(new high tenacity polypropylene filament yarn) on a pilot plant at the Wilton Works, North Yorkshire. The first full-scale plant, with a capacity of 5 million lb. per annum, will commence production by the end of the year, and extensions will be built as required at the new site at Kilroot, Northern Ireland. Since August 1960, when they obtained from Montecatini, Italy, the rights for the manufacture and sale in the U.K. of polypropylene fibres, I.C.I. have been carrying out development work on polypropylene filament yarns. The first commercial uses of "Ulstron" high-tenacity multi-filament yarn will be for fishnetting, twines and ropes.

Leading twine and net makers are now able to receive enquiries for "Ulstron", and it is expected that ropes made from the new yarn will be on the market early next year. "Ulstron" mono-filament yarn is available in small quantities for market evaluation, and will eventually be used in similar outlets.

* * *

Developments in Triple Blend Fabrics

British Celanese Ltd. are introducing a silicone finish for "Tricel" triple blend fabrics ("Tricel"/rayon/nylon). It has been developed to give these fabrics considerably improved properties, in particular, an improved handle, greater resistance to creasing and water repellency, none of which are lost in washing or dry cleaning, it is said.

* * *

Technical Information

The following publications have recently been issued by I.C.I. Ltd., Dyestuffs Division, Blackley, Manchester.

No. 625. Procion Dyes on Cotton: New Processes for Dyeing and Resin Finishing.

No. 630 Cold Dyeing Procion Dyes on Viscose Rayon: Colour Yield by Various Dyeing Methods.

No. 632. Emulsion Thickening in Textile Printing: Possibility of fire and Explosion Hazards During Baking (Dry-Heat) Treatments.

No. 624. Fluolite MP in the Laundry.

No. 626. Use of Velan PF and Velan NW in the Production of Durable Oil— and Water—Repellent Finishes on Textiles.

Auxiliary Products Literature No. 136. Lubrol CB—A New Rayon Spin Bath Additive.

* * *

S.A. Woolgrowers' Levy

Awareness of South African woolgrowers of the need for more funds for promotion and research has been in evidence at all five provincial congresses of the National Woolgrowers' Association, where support was granted to the South African Wool Board to increase the levy if necessary, states the Board. The Board stresses that an increase will be necessary in two years' time. During the coming season it will meet its increased commitments to the I.W.S. from its reserve funds but its chairman, Dr. J. G. van der Wath, has given notice that an increase in the levy will than become necessary. The question of the increased levy will again be raised at the national congress of the National Woolgrowers' Association in Bloemfontein during September, but in view of the fact that the provinces have already signified their approval of an increase for research and promotion, no opposition is anticipated.

* * *

Man-Made Fibres

Holidays at various production factories resulted in a sharp fall in August in production of both yarn and staple, according to the British Man-Made Fibres Federation. The total output at 41·95 mn. lb. compared with 50·76 mn. lb. in July and 43·18 mn. lb. in August last year. August production of filament yarn was 19·41 mn. lb. compared with 21·34 mn. lb. in July and 21·45 mn. lb. in August last year. Staple fibre production fell to 22·54 mn. lb. compared with 29·42 mn. lb. in July, but was slightly larger than in August last year when the total was 21·73 mn. lb. Conclusions to be drawn from peak holiday month statistics are of doubtful value, but at the time of writing the trade as a whole is a little slow in pulling out of the usual summer lull, and only in the acetate section, where demand tends to exceed supply, can business be described as really active. It is believed that the high Bank Rate is resulting in a cautious attitude by the merchanting and distributive trades, which are tending to reduce their stock commitments at present. Cumulative figures to date lag well behind last year's records, total production amounting to 369·61 mn. lb. in the first eight months of the year, compared with 395.16 mn. lb. in the similar period of 1960, but with 325·30 mn. lb. in the first eight months of 1959.

* * *

I.C.I. Fibres Division

Mr. A. R. Milne has been appointed a managing director of I.C.I. Fibres Division jointly with Mr. E. B. Abbot and Dr. F. J. Siddle. For health reasons Dr. Siddle will retire from the Division Board at the end of this year. Mr. C. N. Harries has been appointed a commercial director (Overseas) and Mr. D. N. Marvin has been appointed commercial director (Home). Mr. Milne joined I.C.I. in 1930 and served in the company's sales organisation in London, transferring to the Plastics Division's sales control department in 1943. In 1949 he became regional sales manager for Plastics in the Southern Region, later in 1953 deputy regional manager, Northern Region, and in 1955 joined the Fibres Division Board.

Mr. Harris joined the company in 1934. From 1946 to 1953 he was with I.C.I. (Egypt) Ltd. In 1954 he was appointed Export Sales Manager of the Fibres Division. Mr. Marvin came to I.C.I. in 1942 from Nottingham University. He worked on fibres development with the Plastics Division and transferred to Fibres Division on its formation.

* * *

New Colours for Spring and Summer

A new and bolder approach to colour scheming has been evident for some seasons in the blending of colours in printed fabrics, tweed mixtures and also in the way colours are being used in individual "ensembles". A survey of fabrics for next Spring indicate that it will be "clear and bright" or "dark and smudgy" with "Tawny Pinks" teamed with "Frosted Chocolate"; azalea hues with bright clear pinks and emerald greens give an oriental effect—many designs are Persian and Indian inspired—lilac and fushia tones with pink and white—giving a delicate effect—dark browns and greens enlivened by brilliant splashes of yellow, coral and scarlet and blues ranging from palest sky to dark navy. These colour schemes, based on the Council's fashion colours for Spring and Summer 1962 include 12 colours for machine and hand knits; 32 colours for wool fabric and jersey knits; 35 colours for silk and man-made fibres; 22 colours for cotton—plain, printed and colour woven.

New Companies

D. B. Broxholme Export Co. Ltd. Private. Reg. July 21. Capitol £5,000. Exporters, importers and wool manufacturers. D. B. Broxholme and R. Turner. Registered Office: 1 Aked Street, Bradford.

Watkins Dyeing and Finishing Co. Ltd. Private. Reg. July 24. Capital £5,000. W. Watkins, N. H. Watkins and C. W. Watkins. Registered Office: Middleton Road Dyeworks, Higher Crumpsall, Manchester 8.

Ronald Angless Ltd. Private. Reg. Aug. 2. Capital £20,000. Wool merchants. R. Angless and L. Angless. Registered Office: Harden Mill, Bingley, Yorkshire.

J. W. Howarth and Sons Ltd. Private. Reg. Aug. 3. Capital £5,000. Yarn merchant. J. W. Howarth, Mrs. A. Howarth, R. W. Howarth and G. Y. Howarth. Registered Office: Burns Street Mill, Bolton.

Hove Fabrics Ltd. Private. Reg. Aug. 10. Capital £10,000. Woollen and worsted cloth manufacturers. V. Hovanissian, P. J. D. McCraith and J. L. Hobden. Registered Office: 52a Long Row West, Nottingham.

Dalemar Ltd. Private. Reg. Aug. 10. Capital £2,000. Manufacturers and dealers in fabrics. H. K. Gott and Mrs. O. I. Gott. Registered Office: Stone Craft, Lothersdale, Keighley, Yorks.

Sebec Laminations Ltd. Private. Reg. Aug. 11. Capital £20,000. Processors of textiles, plastic and rubber foam. D. V. Prestwick, D. A. J. Rudd. Solicitors: Stone and Stone, 69 - 71 Moorgate, E.C.2.

Villa Textiles Ltd. Private. Reg. Aug. 25. Capital £1,000. Wholesalers in drapery, etc. P. Black and D. Black. Registered Office: 105c Villa Road, Handsworth, Birmingham 19.

Walton Wools Ltd. Private. Reg. Aug. 30. Capital £5,000. Woollen, worsted and cotton cloth manufacturers. T. H. P. Walton and Mrs. N. Walton, P. Rowan. Registered Office: 20 Chapel Street, Bradford 1.

Vickerstaff and Howard Ltd. Private. Reg. Aug. 30. Capital £1,000. Dealers in wool, tops, noils, etc. W. N. Vickerstaff and D. E. T. Howard. Registered Office: Alma Mill, Crompton Road, Macclesfield, Cheshire.

S. Kaprow and Son Ltd. Private. Reg. Aug. 30. Capital £1,000. Textile merchants and manufacturers. Mrs. R. Kaprow and M. Kaprow. Registered Office: 3 Windmill Street, W.1.

D. and D. Textiles Ltd. Private. Reg. Aug. 29. Capital £1,000. Manufacturers and dealers in textiles, etc. P. Davis and G. S. Drugnick, 82 Warriner Gardens, S.W.11.

L. J. Farinotto and Co. Ltd. Private. Reg. Sept. 5. Capital £1,000. Wool, etc., manufacturers and merchants. J. F. Farinotto, and M. D. Farinotto. Registered Office: 12 Bruton Street, W.1.

Vilinia Ltd. Private. Reg. Sept. 4. Capital £1,000 in £1 shares. Importers and exporters of cloth, linen, cotton, etc. J. E. Bentata, M. D. A. Bentata, and J. A. Bentata. Reg. Office: 2 Brazil Street, Manchester 1.

Hammonds (Wool and Waste) Ltd. Private. Reg. Sept. 11. Capital £1,000. Dealers in wool and waste, etc. P. McNally and Mrs. M. McNally. Registered Office: 2 Grammar School Street, Manor Row, Bradford 1.

Barnes (Textiles) Ltd. Private. Reg. Sept. 13. Capital £1,000. W. A. Skellett and Mrs. G. F. Shellett. Registered Office: 102 Lee High Road, S.E.13.

Harry Cocking Ltd. Private. Reg. Sept. 11. Capital £5,000. Exporters and importers of wool etc. J. H. Metcalfe, J. E. Hardaker and H. Cocking. Registered Office: 40 Piccadilly, Bradford 1.

We are exhibiting at Stand 4004 at the International Knitting Machinery and Accessories Exhibition, Belle Vue, Manchester, October 11th to 21st.

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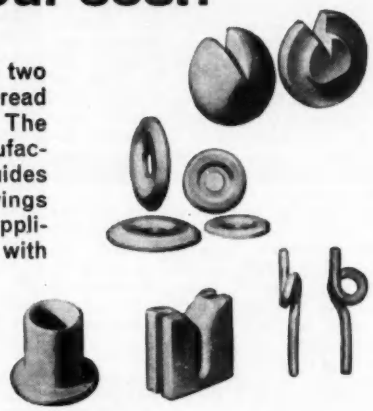

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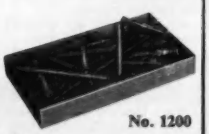

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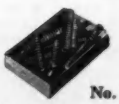

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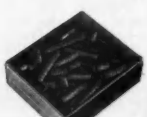

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852,703 Improved High-Speed Winding Machines

LEESONA HOLT LTD., *Atlas Iron Works, Whitworth Road, Rochdale.*

A high speed winding machine has a multiplicity of winding heads and complemental driving rolls. The package holders and packages of the winding heads are not driven by direct surface contact with the driving rolls, but through the intermediary of a rotary traverse cam driven by frictional contact with the driving roll, and transmitting rotary motion to the package holder and package. The method is applicable to winding machines of the travelling spindle type in which winding heads are arranged side by side along both sides of the winding machine and are traversed round the machine, and also to machines of the type in which winding heads are arranged side by side along one or both sides of the machine, and are stationary.

852,962 Crease-Shedding Treatment for Fabrics

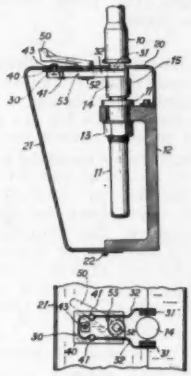
COURTAULDS LTD., *London.*

A process for treating fabrics consisting of, or containing, cellulose fibres to render them crease-shedding comprises applying a diamine such as ethylene diamine or hydroxyethylene diamine to the fabric in the loose state, stretching the fabric, washing out the diamine from the fabric while it is under tension, and drying under tension. In one example, a fabric of 64 ends and 52 picks per in. and woven from viscose rayon staple fibre spun to 18's cotton count was treated in open width, and under as little tension as possible, with ethylene diamine for 2 - 3 minutes at room temperature. The fabric was then stretched to approximately 140% of its wet, relaxed area, and washed with hot water at 70° - 80°C. until free from the ethylene diamine. After drying on the same frame and to the same area, the fabric was wet crease-shedding and wet crease-resisting.

853,166 Improved Spindle Brake

WHITIN MACHINE WORKS, *Whitinsville, Massachusetts, U.S.A.*

Describes a brake for stopping spindles in spinning and twisting frames. A spindle 10 is mounted in a bearing 11 which is secured in a spindle rail 12 by a nut 13. The spindle has a driving whorl 14 which is engaged by a tape 15. The lower part of the bearing, the whorl and the tape are covered by a fixed upper rear casing 20, and by a front casing 21 which is pivoted at its lower end, at 22. The brake comprises a single U-shaped spring 30 having brake pads 31 secured to the free ends 32 of the spring. A supporting plate 40 is provided with headed studs 41, and the spring is assembled between the studs. The plate 40 has a hole to receive a clamping screw 43 by which the plate may be secured to the under side of the front casing 21. A handle 50 is pivoted in a



bearing opening in the top of the casing and the handle has a non-circular extension 52 on which a spreader cam 53 may be firmly assembled. The spreader cam normally engages the inner faces of the spring arms 32 and holds the brake pads apart and clear of the spindle whorl. When it is desired to stop a spindle, the handle 50 is shifted, and the springs 32 then move inward, forcing the pads against the whorl with effective braking pressure.

853,749 Tufted Pile Fabrics

J. L. CARD, 1844 *Crestwood Drive, Chattanooga, Tennessee, U.S.A.*

A method of making a pile fabric comprises simultaneously forming on a base fabric, lines of cut pile producing stitching and lines of loop pile producing stitching, all the lines running in the same predetermined direction. The lines of cut pile and lines of loop pile may be closely spaced and adjacent to each other in various arrangements to provide novel contrasting effects, and may for example comprise a line of cut pile stitching alternating with a line of loop pile stitching.

853,856 Improved Dobby Looms

BRITISH COTTON INDUSTRY RESEARCH ASSOCIATION, *Shirley Institute, Didsbury, Manchester.*

A positive double-lift open-shed dobby comprises baulks each having a hook mounted on each end, a pair of oscillatable knives near the baulks, the hooks being shaped for selective engagement. Front stop means are adjacent each end of each baulk, whereby movement of the respective hook and baulk end with an oscillatable knive may be prevented. Back stop means are adjacent each end of each baulk against which the baulk end may bear, whilst the other baulk end moves under the influence of a knife. Feelers are disposed for operation by a pattern mechanism located outside the dobby mechanism, so as to control the pivotal movement of each hook relative to its baulk so that it engages a knife or a front stop as desired. Oscillation of the baulk ends may be caused to effect controlled shedding of the warp through the agency of jacks carrying the baulks. Each hook extends to both sides of its pivot and has a main hook formation to one side, shaped for engagement with a knife, and a secondary hook formation to the other side. A single part is provided adjacent each baulk end, so constructed and disposed as to constitute in association with the secondary hook formation and the baulk end respectively, both front stop means and back stop means.

854,075 Weft Correcting Apparatus for Fabrics

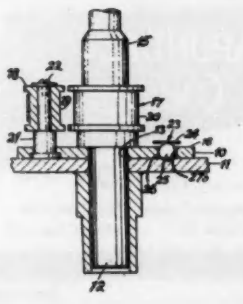
JOHN DALGLISH AND SONS LTD., *Industrial Estate, Thornliebank, Glasgow.*

A device for removing backward bow in the weft of woven fabrics or in courses of knitted fabrics. The device comprises a shaft disposed transversely to the line of progress of the fabric and such as to effect a return bend in the line of progress. A pair of rollers mounted about the shaft have an aggregate width exceeding that of the fabric, and means are provided for effecting lateral adjustment of the rollers along the shaft each to and from a median position relative to the fabric width. If there is a backward bow in the fabric, the rollers can be adjusted transversely each away from the median position to leave a gap, whereby the centre of the fabric travels through a shorter path than the remainder in movement through the return bend to remove the bow.

854,247 Brake for Spinning and Doubling Spindles

WILLIAM KENYON AND SONS LTD., *Chapelfield Works, Dukinfield.*

Apparatus for selectively stopping the spindles on a spinning machine without causing the driving belt to be heated up. One embodiment is shown as assembled on a standard spindle unit. Base plate 10 is affixed to the spindle supporting frame 11 by the spindle bottom journal 12, which is disposed through the central hole 13 of the base plate and is held by the usual journal support. Formed integrally with the spindle 15 adjacent the upper surface 16 of the base plate is a whorl 17. An idler pulley 18 is mounted on the base plate and is radially disposed adjacent to the pulley 17 so that the respective belt-engaging



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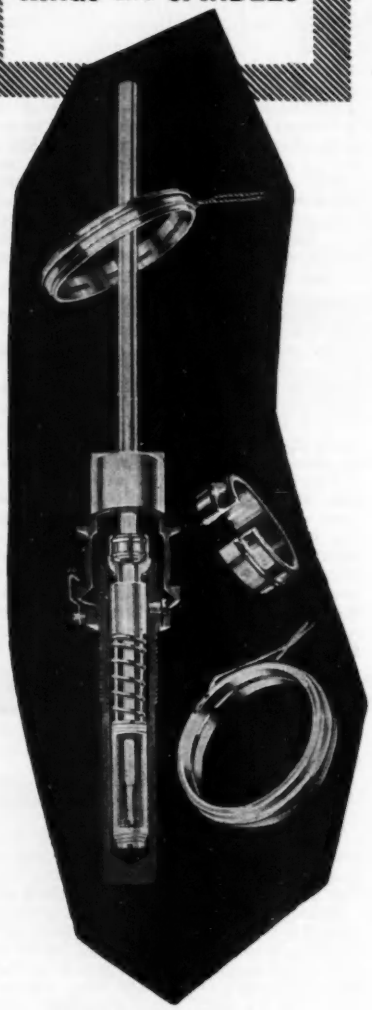

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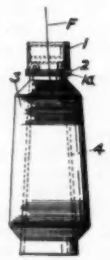
portions 19, 20 of both pulleys are in alignment. Any conventional type of mount can be used for the idler pulley 18, such as the stepped shaft 21. The idler pulley is secured to the shaft 21 by the screw and washer means 22 connected to the upper end. Mounted on the upper surface of the base plate is a spring means 23 comprised of a leaf spring 24 which biases ball bearing 25, located in a hole 26, against the supporting frame 11 and into either of two angularly displaced holes 27*a*, 27*b*. A handle is fixed to the upper surface of the base plate to provide means for swinging the plate relative to the supporting frame.

854,262 Improved Anti-Snarl Device
HOSIERY AND ALLIED TRADES RESEARCH ASSOCIATION, *Nottingham.*

An anti-snarl device for use in drawing-off a yarn from a wound package. The device comprises a cylindrical metal sleeve 1 having at its lower end an out-turned rim 1*a*, rounded in cross-section. Encircling the sleeve above the rim is a metal ring 2 which is also rounded in cross section, and the interior diameter of the ring is greater than the external diameter of the sleeve but less than that of the rim. The outer surface of the sleeve and the



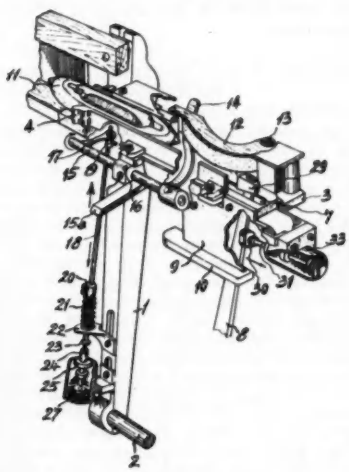
rim and all surfaces of the ring are smooth and polished. The device is intended to be mounted at the top end of a wound package 3 so that the filament "F" drawn from this package extends inwards across the top of the wound filament and passes between the upper surface of the rim and the lower part of the ring, and thence up between the interior of the ring and the periphery of the sleeve.

854,316 Automatic Doffing Apparatus
KANEGAFUCH BOSEKI KABUSHIKI KAISHA, *No.* 1612 *2-chome Sumida-machi, Sumida-ku, Tokyo, Japan.*

An apparatus for automatically mounting and dismounting bobbins on to and from a spinning machine, or twister, the apparatus being arranged to run to and fro along the machine on rails. Means for dismounting bobbins, incorporates a vertical swingable pair of grips for lifting the head of a fully wound bobbin, a fully wound bobbin box, and a device for releasing a gripped bobbin and discharging into the box. Means for feeding empty bobbins to the spindles incorporates a guide chamber, an empty bobbin hopper containing an endless conveyor arranged to deliver empty bobbins one at a time into the guide chamber, and bobbin supports in the chamber for locating the empty bobbins one at a time in an inclined delivery position from whence they will be successively impaled by empty spindles as the apparatus advances. Stop and return means automatically control the travel of the apparatus and an electric motor for driving the apparatus has a coiled lead which is arranged automatically to unwind and wind itself up, as the body advances and returns.

855,311 Improved Looms
J. PICANOL-CAMPS, *Mas Monserrat, Brandon (Var), France.*

On a fast-reed loom the stop rod is connected to a shock absorbing device arranged to damp rotary oscillating movement of the stop rod to eliminate rebounding between the finger, the tongue and the shuttle as the latter enters the box. The slay sword 1 pivots on a shaft 2, with the bar 3 fixed on the upper end of the sword. The shuttle box 4 is fixed on the bar 3, the upper end of the picking arm 8 extends through a slot 7 in bar 3. A bearing plate 9 is fixed to the bar to support the guide 10 for the picking arm. A shuttle 11 is illustrated as approaching the end of its travel. A tongue 12 oscillates about a vertical pin 13 mounted on bar 3, and a finger 14 in contact with the outer face of the tongue is fast with a stop rod 15 which is pivotable in a bearing 16 fixed to the slay sword. A lug 15*a* fast with the stop rod acts on an abutment (not shown) which controls the disengagement of the loom drive so as to stop the loom if the shuttle does not enter satisfactorily. The damping device comprises a lug 17 fast with the stop rod, a damping rod 18 one end of which is passed through a hole formed in the end of the lug 17 and whose



other end is slidable in a support 22 fixed on the slay sword. A first stop ring 19 positions the rod 18 with respect to the strap 17, and a second stop ring 20 serves as an abutment for one end of a spring 21 whose other end bears against the upper face of support 22. The spring tends to move the rod 18 upward, and consequently to pivot the stop rod in the direction which brings about, through the agency of the finger 14, the penetration of the tongue 12 into the shuttle box. The lower end of the damping rod 18 can bear against the head of an adjusting screw 23 which is locked by a lock-nut 24 on a piston rod 25 of a hydraulic shock absorber containing oil and a compression spring 27. The force of spring 27 and spring 21 are relatively slight and are just sufficient to press finger 14 against tongue 12 and to press the tongue into the shuttle box. The loom also comprises a device for damping shocks occurring at the picking arm, constituted by a hydraulic shock absorber fixed on the slay by a lug 33, and whose rod 31 is

arranged to be contacted by a buffer 30 which is secured on the picking arm. The upper end of the picking arm is provided with a picking head 29 against which the shuttle abuts at the end of its travel.

855,531 Locking Mechanism for Weighting Arms of Drafting Units
SKF KUGELLAGERFABRIKEN GESELLSCHAFT MIT BESCHRANKTER HAFTUNG, 52 *Schultestrasse, Schweinfurt am Main, Germany.*

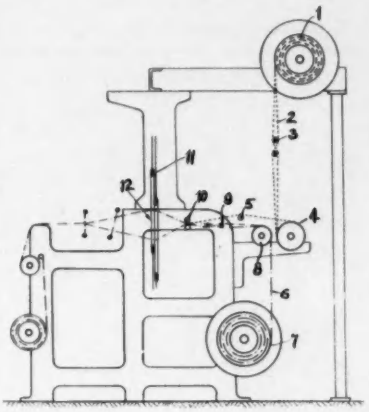
Improved locking mechanism for top roll carrier and weighting arms of drafting apparatus. A lever detent is formed from a pair of levers coupled together by a supporting member, in such manner as to have been moved through a dead centre position when the carrier arm is in the operative position, but to be displaceable in relation to one another until they become positively interlocked during the movement of the operating lever into its position corresponding with the inoperative position of the carrier arm.

855,821 Improved Loose Boss Rollers
HOFFMAN TWEEDALES LTD., *Stonehouse, Gloucestershire,* and T. J. WILLIAMS.

Describes an improved bearing for a roller, which is inexpensive to produce. The roller comprises an arbor provided with two spaced tracks for the reception of assemblies of balls which form bearings for an outer cylindrical race which may either constitute the roller, or upon which a roller sleeve may be mounted. The outer race is restrained against axial displacement by retaining members which are engaged into grooves in the bore of the outer race and towards the ends.

855,914 Highly Elastic Wool Fabrics
SIMONS AND FROWEIN AKT. GES., *Leichlingen-Rheinland, Germany.*

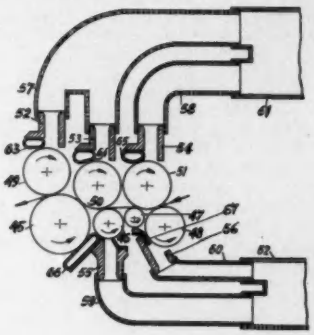
Production of wool fabrics which can readily be made highly elastic and are particularly intended for use in the manufacture of sports clothing. Rubber threads, which can be made of natural rubber and covered with natural or dyed cotton yarn, are formed into a warp 2 which is fed from an upper warp beam 1 rotatable in ball bearings and braked to apply tension to the rubber threads. From this beam the threads are conveyed through a lease 3 and around a second beam 4. This beam consists of a roller which has a grooved surface, the number of grooves being sufficient to provide individual guides for the rubber warp threads. From the beam the rubber threads are led to heddles 11.



The tensioned rubber threads travel from beam 1 over beam 4 and thence to the heddles 11, the beam 4 serving to equalise the tension on the rubber threads in either direction by virtue of the overlap of the threads around the beam. A stationary lifting rod 5 is interposed between beam 4 and the heddles 11 to facilitate the delivery of the rubber threads from the grooved roller and to ensure that the threads are delivered to the heddles smoothly and under uniform tension. The threads of the rubber warp 2 and of a wool warp 6, supplied from a beam 7 are brought together and at the same time braked by two bars 10 before reaching the heddles, so as to obtain a clear shed 12. The tension can be adjusted with a lead on the part of the rubber threads of up to 17% relatively to the wool warp. The rubber threads are introduced as warp threads on the under surface of the fabric, and the visible aspect of the upper side of the fabric is scarcely affected by the interlacing points. The wool warp 6 is caused to travel in normal manner from the lower beam 7 over a beam 8 and past lease rods 9 and between the bars 10 to the heddles. The wool weft is introduced into the shed in known manner. The fabric, when taken from the loom, has a normal stretch in the warp and weft directions. A high degree of elasticity is then imparted to the fabric by treating with wet steam and heat, at approximately 4·5 atmospheres in excess of atmosphere pressure and at 140° - 150°C., during which treatment the rubber threads become locked in the fabric.

855,957 Apparatus for Cleaning Rollers
LUWA A.G., *Anemonenstrasse* 40, *Zurich, Switzerland.*

Describes an apparatus for cleaning a thread-carrying roller. In one arrangement each of the upper cylinders 49 to 51 has allotted to it, its own suction duct 52, 53, 54 respectively, whilst a common suction duct is provided for the lower cylinders 45 and 46 and a common suction duct is provided for the lower cylinders



47 and 48. The ducts 52 to 56 are connected by way of intermediate sections 57, 58, 59, 60 to collecting pipes 61 and 62, which are connected to the suction side of a blower. Each of the upper ducts 52 to 54 carries a cleaning member 63, 64, 65 respectively which is in the form of a flexible tube which bear against a cylinder, whereas the cleaning members 66 and 67 carried by the lower suction ducts each co-operate with two cylinders.

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